

ADDENDUM

Project No.: 2301106 Project: WCSC Milford Elementary

Addendum No: 3 Date: 07-23-2024

TO: ALL BIDDERS OF RECORD

ADDENDUM NO. 3, to Drawings and Specifications dated 06-21-2024, for the new Milford Elementary School for the Wawasee Community School Corporation; as prepared by ELEVATUS Architecture, 111 E. Wayne Street, Suite 555, Fort Wayne, IN 46802

This ADDENDUM shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified and set forth in this ADDENDUM.

Each Bidder shall acknowledge receipt of this ADDENDUM on the Bid Form.

ACCEPTABLE MANUFACTURERS:

- A. The following additional manufacturers are acceptable for use on this project. Listing herein does not authorize a blanket approval of the manufacturer listed, it only acknowledges that the manufacturer is capable of complying with the referenced technical specifications. Final approval and acceptance shall be solely by the Architect at his discretion.
 - 1. Section 06 10 00 Rough Carpentry
 - "Parapet Cap" by Prebuck, Wyoming, MI
 - 2. Section 09 80 00 Acoustical Wall Treatment
 - G & S Acoustics, St. Louis, MO

PROJECT MANUAL:

ITEM NO. 1.00 - PROJECT MANUAL

A. See supporting Documentation from Michael Kinder & Sons for revisions to the Project Manual and answers to Bidding RFI's

ITEM NO. 1.01 - PROJECT MANUAL, 00 01 10 Table of Contents

A. Refer to revised Section 00 01 10 attached to this Addendum No. 3.

ITEM NO. 1.02 - PROJECT MANUAL, 03 41 00 Precast Concrete Sills/Copings

A. Refer to revised Section 03 41 00 attached to this Addendum No. 3.

ITEM NO. 1.03 - PROJECT MANUAL, 04 22 00 Unit Masonry

A. Refer to revised Section 04 22 00 attached to this Addendum No. 3.

ITEM NO. 1.04 - PROJECT MANUAL, 07 21 00 Building Insulation

A. Refer to revised Section 07 21 00 attached to this Addendum No. 3.

ITEM NO. 1.05 - PROJECT MANUAL, 07 27 29 Air Barriers

A. Refer to revised Section 07 27 29 attached to this Addendum No. 3.

ITEM NO. 1.06 - PROJECT MANUAL, 07 54 00 Fully Adhered PVC Sheet Roofing

A. Refer to revised Section 07 54 00 attached to this Addendum No. 3.

ITEM NO. 1.07 – PROJECT MANUAL, 08 51 13 Aluminum Windows

A. Refer to revised Section 08 51 13 attached to this Addendum No. 3.

ITEM NO. 1.08 - PROJECT MANUAL, 10 51 00 Lockers

A. Delete this Section 10 51 00 Lockers in its entirety. Lockers are provided and installed by the Owner.

ITEM NO. 1.09 - PROJECT MANUAL 10 51 13.13 Athletic Lockers

A. Delete this Section 10 51 13.13 in its entirety. Athletic lockers are provided and installed by the Owner.

DRAWINGS:

ITEM NO. 2.01 - A-111a Architectural Notation Plan - Area A

A. Revision to plan note 10.08

ITEM NO. 2.02 - A-401 Enlarged Plans & Elevations

- B. Addition of elevation #14 to room RR 105
- C. Addition of elevation #15 to rooms RR 104
- D. Addition of elevations #16, 17, & 18 to rooms RR 079, RR 081, RR 027, and RR 028
- E. Addition of elevation #13 to room T RR 017
- F. Revision to plan note 10.08

ITEM NO. 2.03 - Civil Addendum

A. See supporting documentation

ITEM NO. 2.04 - Structural Addendum

A. Sheet S-102b – Masonry Plan - B: Added three masonry lintels at the locations indicated. (see revised drawing)

B. Sheet S-103b – Framing Plan – Low Roof & Mezzanine – Area B: Noted weight and location of EF-4 for coordination. (see revised drawing)

ITEM NO. 2.05 - MEP Addendum

A. See supporting documentation

Submitted By:

Samuel R. Schaust, AIA



cc: 🗆 File:

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- □ Owner:
- □ Contractor:
- □ Consultant:
- □ Consultant:



Milford Elementary School - New Building

July 22, 2024

ADDENDUM NO. 3

This addendum is issued as a supplement to the plans and specifications and shall be considered an integral part of the same.

Item:	3.01		
Location:	Question: 1.Alternate No. 3 states to provide an added cost for BIM. What level of BIM is required, it states the		
	CM will monitor the meetings but who will coordinate the BIM process, and where is it in the construction		
	schedule?		
Description:	Response: Level 300 will be required. A 3rd party will be brought on to coordinate the BIM process. If BIM is		
	selected time will be outlined in the schedule.		
Item:	3.02		
Location:	Volume 2 of 3 CD Specs		
Description: This volume was lacking several structural steel sections when Elevatus distributed bid documents. <i>J</i>			
	includes Sections 050519 Post Installed Anchors, 051200 Structural Steel Framing, 052100 Steel Joist Framing, 053100 Steel Decking and 054000 Cold Formed Metal Framing.		
Item:	3.03		
Location:	RFI Precon 26		
Description:	Question: Will integral water repellant be required in the exterior mortar, ref. 044200 1.2 G 3 & 4?		
	Response: Integral water repellant will not be required.		
Item:			
Location:	3.04 RFI Precon 28		
Description:	Question: I have a question concerning the membrane and the membrane color. 07-54-00-5 Part 2 Products list		
	Duro-Last X 60 mil. Section 2.2 #11 mentions the membrane is to be light gray. Duro-Last X comes in white only.		
	The only product that they carry that is comparable to the Duro-Last X is the Duro-Last 60 mil. Was not sure		
	which of the two held more importance. Please advise. I have attached a spec sheet of the Duro-Last 60 mil for		
	your reference.		
	Response: Provide the white membrane. Spec will be revised.		
Item:	3.05		
Location:	RFI Precon 30		
Description:	Question: The construction schedule calls for the MEP underground to commence January to February 2025. Will		
	the pad be protected from freezing?		
	Response: No the pad will not be protected from freezing.		
140.000			
Item: Location:	3.06 RFI Precon 13 - Section 114000		
Description:	Question: Section has paragraph about existing equipment. Need clarification.		
2000.19.00.00	Response: Do not include moving any existing equipment to new kitchen. Section in wrong.		
Item:	3.07		
Location:	Question: What is to be salvaged from existing buildiing?		
Description:	Answer: Owner's staff will handle all salvage.		
Item:	3.08		
Location:	Bid Package 06a General Trades		
Description:	This bid package is to provide full time supervision while performing BP 06a scope at the jobsite.		
Item:	3.09		
Location:	Parapet Wall Rigid Insulation Responsibility		
Description:	Clarification: if rigid insulation is behind a roof membrane (several details on A500 series), Bid Package 07a is		
	responsible for the vertical rigid insulation. Bid Package 06a General Trades is responsible for plywood on top of the veritical rigid insulation.		
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Item:	3.10		
Location:	Bid Package 06a General Trades Supplement Instructions To This Bid Package		
Description:	Item 7 ends when new building is turned over to WCSC.		
Item:	3.11		
Location:	Bid Package 06a General Trades Project Specific Scope		
Description:	Delete Item 1.		
Item:	3.12		
Location:	Bid Package 04a Masonry		
Description:	This scope is to include all masonry inspections per Sections 004200 and 044200.		
	3.13		
Item:	RFI Precon 31 Cementitious Damproofing		
Location:	Question: clarify requirements for damproofing.		
Description:	Response: . Arriscraft's Adair Limestone product is specified two other manufacturers. These products are all		
	dolomitic limestone. Because it is an actual limestone product, the cementitious dampproofing is required as		
	specified. Dampproof the first course.		
	3.14		
Item:	Section 042200		
Location: Description:	Question: Will integral water repellant be required in the exterior mortar? ref. 042200 1.2 G 3 & 4?		
Description.	Response: Integral water repellant additives will not be required.		
	3.15		
Item:	Secitor 072729 Air Barriers		
Location:	Question: Section 07 27 29, 1.5, F. Calls for ABAA-certified installers and supervisors. We have installed many masonry projects over the past twenty years and are Manufacturer trained in Air Vapor Barriers. Is ABAA-		
	certification a requirement on this project?		
Description:	Answer: ABAA Certification will not be required. The certification requirement will be deleted.		
ltom:	246		
Item: Location:	3.16 REL Precon 38		
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Item: 3.20 Location: Bid Package 31a Earthwork Question: Sheet C600 calls out the stone as "#73 or #53 stone or aggregate" and "#2 aggregate." (if INDOT CADD activitied account if a store of #72 arguel and #2 argueled account would be account if it in a store at the store at			
Description:	if INDOT CAPP certified process #53 gravel and #2 recycled crushed concrete would be acceptable? ***Also similar question asked RFI Precon-17: can crushed concrete or locally available gravel be used in lieu of crushed limestone?		
Description.	Response (to both): Yes, the specified materials are acceptable. Also, please note: Removed pavement may be pulverized and amended per specification and used as subgrade fill under new pavements and walkways, but in no circumstance will the amended mix be allowed as utility trench backfill, subgrade fill under building slabs and foundations, or under lawn areas. A proposed design mix must be approved by a certified geotechnical engineer, and approved by the Owner's Agent prior to any operations. Gravel drive material may be used as subgrade fill below new pavement and walkway areas, but in no circumstance will the material be allowed as utility trench backfill, subgrade fill under building slabs and foundations, or under lawn areas.		
Item: Location:	3.21 Bid Package 31a Earthwork Project Specific Scope		
Description:	Add Item 38, This bid package is responsible to bring building pad subgrade to +25".		
Item: Location: Description:	3.22 Bid Package 31a Earthwork Supplemental Instructions to this Bid Package Delete Item 17 and Item 19.		
Item:	3.23		
Location: Description:	Bid Package 31a Earthwork Project Specific Scope Add Item 37, This bid package is responsible for cut & fill/grading for sidewalks and concrete paving including removing spoils from project site. BP 03a is responsible for stone for sidewalks and concrete paving.		
Item:	3.24		
Location:	Question: Who is responsible for erosion control blankets, seeding under blankets and topsoil including grading under the blankets?		
Description:	Answer: Since this is part of the Erosion Control plans, Detail 3 on C504, Bid Package 31a is responsible for this		
	work. It will require partnering with a contractor experienced in seeding. All other seeding is by Bid Package 32b Lawns & Landscaping		
Item:			
Item: Location: Description:	Lawns & Landscaping		
Location: Description: Item:	Lawns & Landscaping 3.25 Question: Can ERI provide a drainage design (roof, north half of site) for use during construction? Response: This is not covered in ERI contract. It will be the responsibility of BP 31a to design and install a drainage system to remove all stormwater during building construction. 3.26		
Location: Description:	Lawns & Landscaping 3.25 Question: Can ERI provide a drainage design (roof, north half of site) for use during construction? Response: This is not covered in ERI contract. It will be the responsibility of BP 31a to design and install a drainage system to remove all stormwater during building construction.		
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SECTION 05 05 19 - POST-INSTALLED ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Drilled in anchors for concrete and masonry. Type, size, and locations as indicated on Drawings.
- B. Related Sections:

1.	Cast-in-Place Concrete	Section 03 30 00
2.	Unit Masonry	Section 04 20 00
3.	Structural Steel Framing	Section 05 12 00

1.3 SUBMITTALS

- A. <u>Do not submit MSDS or SDS sheets with product data submittal.</u> Engineer of Record is not responsible for review of this information.
- B. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion, and undercut anchors.
- C. Quality Assurance Submittals:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. ICC ES Evaluation Reports.
- D. Manufacturer's installation instructions.
- E. Installer Qualifications & Procedures: Submit installer qualifications as stated in Section 1.4.A. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Drilled-in anchors shall be installed by an installer with at least three years of experience performing similar installations.
- B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the installer on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
 - 1. Hole drilling procedure
 - 2. Hole preparation & cleaning technique
 - 3. Adhesive injection technique & dispenser training / maintenance

- 4. Rebar dowel preparation and installation
- 5. Proof loading/torquing
- C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have one of the following certifications:
 - 1. ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 1 Section–Product Storage and Handling Requirements.
 - 1. Store anchors in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

- 2.1 MATERIALS
 - A. Fasteners and Anchors:
 - 1. Carbon and Alloy Steel Nuts: ASTM A563.
 - 2. Carbon Steel Washers: ASTM F436.
 - 3. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.
 - 4. Wedge Anchors: ASTM A510; or ASTM A108.
 - 5. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
 - 6. Stainless Steel Nuts: ASTM F594.
 - 7. Zinc Plating: ASTM B633.
 - 8. Hot-Dip Galvanizing: ASTM A153.
 - 9. Reinforcing Dowels: ASTM A615

2.2 DRILLED-IN ANCHORS

- A. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage complete with required nuts and washers. Provide anchors with length identification markings conforming to ICC ES AC01 or ICC ES AC193. Type and size as indicated on Drawings.
 - 1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1).
 - 2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik Bolt 3, ICC ESR-1385 and ESR-2302.
 - b. Hilti Kwik Bolt TZ, ICC ESR-1917 (carbon steel and AISI Type 304 Stainless Steel).
- A. Screw Anchors: screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
 - Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating equivalent to DIN EN ISO 4042 (8μm min.).

- 2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik-HUS-EZ, ICC-ESR 3027.
 - b. Hilti Kwik-HUS EZ-I, ICC-ESR 3027.
 - c. Hilti Kwik-HUS.
- B. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
 - 1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel threaded rods conforming to ASTM A36, ASTM A 193 Type B7 or ISO 898 Class 5.8 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1) [or carbon steel HIT TZ rods conforming to ASTM A510 with chemical composition of AISI 1038].
 - 2. Reinforcing dowels shall be A615 Grade 60.
 - 3. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti HAS threaded rods with HIT-HY 200 Safe Set System using Hilti Hollow Drill Bit System for anchorage to concrete, ICC ESR-3187.
 - b. Hilti HIT-Z anchor rods with HIT-HY 200 Safe Set System for anchorage to concrete, ICC ESR-3187.
 - c. Hilti HAS threaded rods with RE 500 SD Injection Adhesive Anchoring System for anchorage to concrete, ICC ESR-2322.
 - d. Hilti HAS threaded rods with RE 500 Injection Adhesive Anchoring System for anchorage to concrete.
- E. Capsule Anchors: Threaded steel rod, inserts and reinforcing dowels with 45 degree chisel point, complete with nuts, washers, glass or foil capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, and manufacturer's installation instructions. Type and size as indicated on Drawings.
 - 1. Interior Use: Unless otherwise indicated on the Drawings, provide chisel-pointed carbon steel rods conforming to ASTM A36, ASTM A 193 Type B7 or ISO 898 Class 5.8 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1).
 - 2. Reinforcing dowels shall be A615 Grade 60, with 45-degree chisel-points at embedded end.
 - 3. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Architect, provide the following:
 - a. Hilti HVA Adhesive System with HVU capsules.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Drilled-In Anchors:
 - 1. Drill holes with rotary impact hammer drills using carbide-tipped bits or hollow drill bit system. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
 - a. Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer's instructions.

- b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
- c. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
- 2. Perform anchor installation in accordance with manufacturer instructions.
- 3. Wedge Anchors, Heavy-Duty Sleeve Anchors, and Undercut Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.
- 4. Cartridge Injection Adhesive Anchors: Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
- 5. Capsule Anchors: Perform drilling and setting operations in accordance with manufacturer instructions. Clean all holes to remove loose material and drilling dust prior to installation of adhesive. Remove water from drilled holes in such a manner as to achieve a surface dry condition. Capsule anchors shall be installed with equipment conforming to manufacturer recommendations. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
- 6. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.

3.2 REPAIR OF DEFECTIVE WORK

A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
 - 1. Mechanical Anchors:

- a. Inspect installation of the first 10 post-installed mechanical anchors for each individual installer with each individual anchor product.
- b. Inspect 10% of the remaining anchor installations after the initial verification.
- 2. Adhesive Anchors and Reinforcing Dowels:
 - a. Inspect installation of the first 10 post-installed adhesive anchors for each individual installer with each individual anchor product.
 - b. Inspect 10% of the remaining anchor installations after the initial verification.
- 3. Verify that each inspected anchor and dowel is installed in accordance with manufacturer's printed installation instructions as well as the following requirements:
 - a. Anchor/product type, manufacturer and material grade
 - b. Anchor diameter, length and installed embedment depth
 - c. Hole diameter and depth
 - d. Hole preparation (cleaning procedure and cleanliness)
 - e. Edge distances and spacing
 - f. Inspect expansion bolt installation for proper torque.
- 4. The following additional requirements apply to adhesive anchors and reinforcing dowels:
 - a. Verify the proper adhesive product is used in each application.
 - b. Verify the adhesive product being used has not exceeded its expiration date.
 - c. Verify proper mixing and installation of the adhesive.
- B. Testing Agency: Contractor will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - Testing: 10% of each type and size of drilled-in anchor shall be proof loaded by the independent testing laboratory. Adhesive anchors and capsule anchors shall not be torque tested unless otherwise directed by the Engineer. If more than 10% of the tested anchors fail to achieve the specified torque or proof load, all anchors of the same diameter and type as the failed anchor shall be tested, unless otherwise instructed by the Engineer.
 - a. Tension testing should be performed in accordance with ASTM E488.
 - b. Torque shall be applied with a calibrated torque wrench.
 - c. Proof loads shall be applied with a calibrated hydraulic ram. Displacement of adhesive and capsule anchors at proof load shall not exceed D/10, where D is the nominal anchor diameter.
 - d. The applied proof load shall be equal to 100% of the allowable tension load capacity of the anchor.

END OF SECTION 05 05 19

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

2.

- A. Section Includes:
 - 1. Structural steel, including:
 - a. Lintels
 - b. Loose angles
 - c. Embed plates
 - d. Bearing plates
 - Shear stud connectors.
 - 3. Shrinkage-resistant grout.

B. Related Sections:

- 1. Cast-in-Place Concrete
- 2. Unit Masonry
- 3. Post-Installed Anchors
- 4. Steel Decking
- 5. Metal Fabrications
- 6. Metal Pan Stairs
- 7. High Performance Coatings

Section 03 30 00 Section 04 20 00 Section 05 05 19 Section 05 31 00 Section 05 50 00 Section 05 51 00

Section 09 96 00

- 1.3 DEFINITIONS
 - A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. <u>Do not submit MSDS or SDS sheets with product data submittal.</u> Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of product.

- C. Shop Drawings: Show fabrication of structural-steel components. The fabricator shall neither use nor reproduce any part of the Drawings as part of the shop or erection drawings.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
- D. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads (other than simple shear connections), include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural-steel materials, including chemical and physical properties.
- C. Product Test Reports
- D. Survey of existing conditions.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.
- C. Deliver items which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.
- D. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Where end reactions are not shown on the Contract Documents, design simple shear connections for at least 50% of the allowable uniform load given in the beam tables in Chapter 3 of the AISC "Steel Construction Manual" for the given span and beam size. Use allowable stress design values unless noted otherwise.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992 Grade 50.
- B. Channels, Angles: ASTM A36.
- C. Plate and Bar: ASTM A36.
- D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C, structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
 1. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavyhex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
- D. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

2.4 RODS

- A. Anchor Rods: ASTM F1554, unheaded type unless noted otherwise.
 - 1. Grade: As indicated.
 - 2. Configuration: Straight.
 - 3. Nuts: ASTM A563 heavy-hex carbon steel.
 - 4. Plate Washers: ASTM A36 carbon steel.
 - 5. Washers: ASTM F436, Type 1, hardened carbon steel.
 - 6. Finish:
 - a. Plain unless noted otherwise.
 - b. Hot-dip zinc coating, ASTM A153/A153M, Class C when exposed to weather or earth.
- B. Threaded Rods: ASTM A36 unless noted otherwise.
 - 1. Nuts: ASTM A563 heavy-hex carbon steel.
 - 2. Washers: ASTM F436, Type 1, hardened or ASTM A36 carbon steel.
 - 3. Finish: Plain unless noted otherwise.

2.5 PRIMER

- A. Steel Primer:
 - 1. Comply with Painting and High Performance Coating requirements in Division 9.
 - 2. Unless noted otherwise in Division 9, Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanizing Repair Paint: SSPC-Paint 20.
- C. Refer to Division 9 for painting specifications.

2.6 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 - 6. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Fabricate for delivery sequence, which will expedite erection and minimize field handling of materials.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

- 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, mechanically thermal cut or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1 unless noted otherwise.
- G. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1 and manufacturer's written instructions.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- I. Metal Surfaces: For fabrication of work which will be exposed to view, use only material which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.
 - 2. For welding of reinforcing bars to structural steel comply with AWS D1.4 for requirements including preheat as required.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

- 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
- 2. Surfaces to be field welded.
- 3. Surfaces of high-strength bolted, slip-critical connections.
- 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
- 5. Galvanized surfaces unless indicated to be painted.
- 6. Unless noted elsewhere.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Coordinate minimum surface-preparation requirements with selections of primers, paint, and coating systems.
- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

- A. If the fabricator is one that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, the following requirements do not need to be performed by an independent agency. However, the reports of any nondestructive testing of welds are to be reviewed by the independent testing agency. At the completion of fabrication, the AISC Certified fabricator shall submit a certificate of compliance stating that the materials supplied and work performed by the fabricator are in accordance with the construction documents.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1 and the following inspection procedures:
 - a. Inspect 100% of complete joint penetration shop welds.
 - b. Inspect 100% of partial joint penetration shop welds.
 - c. Inspect 100% of fillet shop welds in lateral-load-resisting braced frames and moment frames.
 - d. Inspect 10% of other fillet shop welds.
 - e. Visually inspect shop welds according to AWS D1.1.
 - f. Verify welding procedures are in accordance with AWS requirements.
 - g. Perform pre-welding inspections, including:
 - 1) Verifying welding procedure specifications (WPSs).
 - 2) Manufacturer certifications for welding consumables.
 - 3) Proper storage of welding rods.
 - 4) Material identification (type/grade).
 - 5) Welder identification system in place.
 - 6) Fit-up of groove welds.
 - 7) Configuration and finish of weld access holes.
 - 8) Fit-up of fillet welds.
 - Perform inspections during welding, including:
 - 1) Use of qualified welders.
 - 2) Control and handling of welding consumables.
 - 3) Not welding over cracked tack welds.
 - 4) Proper environmental conditions for welding.
 - 5) WPSs followed.
 - 6) Correct welding techniques utilized.
 - 7) Inspect pre-heat, post-heat and surface preparation between passes.

h.

STRUCTURAL STEEL FRAMING

- i. Perform inspections after welding, including:
 - 1) Welds cleaned.
 - 2) Welder identification is legible.
 - 3) Size, length and location of welds.
 - 4) Welds meet visual acceptance criteria.
 - 5) Check for arc strikes.
 - 6) Wide flange member k-areas checked for cracks where welds have been performed in the k-area.
 - 7) Backing bars and weld tabs removed (if applicable).
 - 8) Repair activities completed.
 - 9) Welded joint acceptance/rejection documented.
- j. Provide continuous inspection for full-penetration and partial-penetration groove welds and multi-pass fillet welds.
- k. All Complete-Joint-Penetration groove welds subject to transversely applied tension loading shall be tested using Ultrasonic Testing. 100% of the joints are to be tested. Refer to Drawings for joints subject to this requirement.
- 3. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts." Inspect bolted connections as follows:
 - a. Inspect 100% of shop bolted connections in lateral-load-resisting braced frames and moment frames.
 - b. Inspect 20% of all other bolted shop connections.
 - c. Perform per-bolting inspections including:
 - 1) Check manufacturer certifications for fastener materials.
 - 2) Verify fasteners marked in accordance with ASTM requirements.
 - 3) Proper fasteners (grade, type, length) used for the joint detail.
 - 4) Proper bolting procedure selected for the joint detail.
 - 5) Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.
 - 6) Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used (not required for snug-tight connections).
 - 7) Proper storage provided for fasteners and associated components.
 - Perform inspections during bolting including:
 - 1) Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.
 - 2) Joint brought to the snug-tight condition prior to the pretensioning operation (if required).
 - 3) Fastener component not turned by the wrench prevented from rotating.
 - 4) Fasteners pretensioned (if required) in accordance with the RCSC Specification systematically from the most rigid point toward the free edges.
 - 5) Monitoring of installation not required for snug-tight connections.
 - e. Perform inspections after bolting including:
 - 1) Verify quantity, size and grade of bolts, and proper fit-up of connected elements.
 - 2) Documentation of acceptance/rejection of bolted connections.
- 4. Prepare test and inspection reports.

PART 3 - EXECUTION

d.

- 3.1 EXAMINATION
 - A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work.
 - 1. Furnish templates and other devices as necessary for presetting rods and other anchors to accurate locations.
 - 2. Refer to Division 3 of these specifications for anchor rod installation requirements in concrete.
- C. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bondreducing 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. Weld plate washers to top of baseplate.
 - 3. Snug-tighten (unless noted otherwise) 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.
 - 4. Promptly pack shrinkage-resistant 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 grouting.
- D. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- F. Splice members only where indicated.
- G. Do not use thermal cutting during erection unless written approval is provided by Engineer of Record. Finish thermally cut sections within smoothness limits in AWS D1.1.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

- 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780.
- B. Touchup Painting:
 - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Cleaning and touchup painting are specified in Division 9.
- C. Touchup Priming: Cleaning and touchup priming are specified in Division 9.

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
 - 1. Visually inspect structural steel elements as follows:
 - a. Inspect 100% of beam and girder construction and assemblies
 - b. Inspect 100% of all braced frames and moment frames
 - 2. Visually inspect steel as it is received for possible damage in shipping, workmanship, and piece marking.
 - 3. Review certified mill test reports and identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes.
 - 4. Verify that steel member sizes and steel grade conform to the contract documents and approved shop drawings.
 - 5. Check the installation of base plates for proper leveling.
 - 6. Verify the proper grout type and installation procedures are followed.
 - 7. Verify that anchor rod washers are welded to the base plates, at locations specified on the Drawings, prior to anchor rod tops being covered up.
 - 8. Inspect field welded connections as follows:
 - a. Inspect 100% of complete joint penetration field welds.
 - b. Inspect 100% of partial joint penetration field welds.
 - c. Inspect 100% of fillet field welds in lateral-load-resisting braced frames and moment frames.
 - d. Inspect 10% of other fillet field welds
 - e. Visually inspect field welds according to AWS D1.1.
 - f. Verify welding procedures are in accordance with AWS requirements.
 - g. Perform pre-welding inspections, including:

- 1) Verifying welding procedure specifications (WPSs).
- 2) Manufacturer certifications for welding consumables.
- 3) Proper storage of welding rods.
- 4) Material identification (type/grade).
- 5) Welder identification system in place.
- 6) Fit-up of groove welds.
- 7) Configuration and finish of weld access holes.
- 8) Fit-up of fillet welds.
- h. Perform inspections during welding, including:
 - 1) Use of qualified welders.
 - 2) Control and handling of welding consumables.
 - 3) Not welding over cracked tack welds.
 - 4) Proper environmental conditions for welding.
 - 5) WPSs followed.
 - 6) Correct welding techniques utilized.
 - 7) Inspect pre-heat, post-heat and surface preparation between passes.
- i. Perform inspections after welding, including:
 - 1) Welds cleaned.
 - 2) Welder identification is legible.
 - 3) Size, length and location of welds.
 - 4) Welds meet visual acceptance criteria.
 - 5) Check for arc strikes.
 - 6) Wide flange member k-areas checked for cracks where welds have been performed in the k-area.
 - 7) Backing bars and weld tabs removed (if applicable).
 - 8) Repair activities completed.
 - 9) Welded joint acceptance/rejection documented.
- j. Provide continuous inspection for full-penetration and partial-penetration groove welds and multi-pass fillet welds.
- 9. Inspect bolted connections as follows:
 - a. Inspect 100% of all pre-tensioned and slip-critical bolted connections.
 - b. Inspect 100% of bolted connections in lateral-load-resisting braced frames and moment frames
 - c. Inspect 20% of all other bolted connections.
 - d. Perform per-bolting inspections, including:
 - 1) Check manufacturer certifications for fastener materials.
 - 2) Verify fasteners marked in accordance with ASTM requirements.
 - 3) Proper fasteners (grade, type, length) used for the joint detail.
 - 4) Proper bolting procedure selected for the joint detail.
 - 5) Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.
 - 6) Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used (not required for snug-tight connections).
 - 7) Proper storage provided for fasteners and associated components.
 - e. Perform inspections during bolting, including:
 - Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.
 - Joint brought to the snug-tight condition prior to the pretensioning operation (if required).
 - 3) Fastener component not turned by the wrench prevented from rotating.

- 4) Fasteners pretensioned (if required) in accordance with the RCSC Specification systematically from the most rigid point toward the free edges.
- 5) Monitoring of installation not required for snug-tight connections.
- f. Perform inspections after bolting, including:
 - 1) Verify quantity, size and grade of bolts, and proper fit-up of connected elements.
 - 2) Documentation of acceptance/rejection of bolted connections.
- g. For slip-critical bolted connections, verify installation is performed in accordance with one of the following methods:
 - 1) Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 3) Twist-off Tension Control Bolt: ASTM F 1852.
 - 4) Direct-Tension Control Bolt: ASTM F 1852.
- 10. Inspect steel frame for compliance with structural drawings, including bracing, member configuration and connection details.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
 - 1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 - 2. Welded Connections:
 - a. Visually inspect field welds in accordance with AWS D1.1. Any welds that warrant further evaluation following a visual inspection, shall be tested and inspected in accordance with AWS D1.1 and the following inspection procedures, at the testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94.
 - b. All Complete-Joint-Penetration groove welds subject to transversely applied tension loading shall be tested using Ultrasonic Testing. 100% of the joints are to be tested. Refer to Drawings for joints subject to this requirement.

END OF SECTION 05 12 00

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SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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

1.2 SUMMARY

- Α. Section Includes:
 - 1. K-series steel joists.
 - 2. KCS-type K-series steel joists.
 - 3. K-series steel joist substitutes.
 - 4. LH-series long-span steel joists.
 - Steel joist accessories. 5.

Β. **Related Sections:**

1.	Structural Tests and Inspections	Section 01 45 30
2.	Cast-In-Place Concrete	Section 03 30 00
3.	Unit Masonry	Section 04 20 00

- Unit Masonry 3.
- 4. Structural Steel Framing

1.3 DEFINITIONS

Α. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

Section 05 12 00

Β. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

ACTION SUBMITTALS 1.4

- Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for Α. review of this information.
- Β. Product Data: For each type of joist, accessory, and product.
- C. Shop Drawings:
 - 1. Include layout, designation, number, type, location, and spacing of joists.
 - 2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.5 INFORMATIONAL SUBMITTALS

Α. Welding certificates.

- B. Manufacturer certificates.
- C. Mill Certificates: For each type of bolt.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications".
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1, "Structural Welding Code Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications".
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 STEEL JOISTS

- A. K-Series Steel Joist: Manufactured steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
 - 2. K-Series Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
 - 3. Top Chord Extensions: Provide either SJI Type S or Type R as required to support the loads indicated on the Drawings. Extensions to comply with SJI's "Specifications."
 - 4. Camber joists according to SJI's "Specifications" unless noted otherwise on the Drawings.
 - 5. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.
- B. Long-Span Steel Joist: Manufactured steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated on Drawings.
 - 1. Camber long-span steel joists according to SJI's "Specifications."
 - 2. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.2 PRIMERS

A. Primer:

- 1. SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
- 2. Provide shop primer that complies with Division 9 painting requirements.

2.3 STEEL JOIST ACCESSORIES

- A. Bridging:
 - 1. Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction.
 - 1. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated on Drawings.
 - 2. Finish: Plain, uncoated
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Plain
- D. Welding Electrodes: Comply with AWS standards.
- E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.4 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Shop priming of joists and joist accessories is specified in Division 9. At a minimum, apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - 4. Do not rigidly connect bottom-chord extensions to columns or supports unless noted otherwise on the Drawings.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts unless noted otherwise.
- E. Bolt joists to supporting steel framework using high-strength structural bolts as indicated on the Drawings. Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 REPAIRS

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Touchup Painting:
 - 1. Cleaning and touchup painting are specified in Division 9.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
 - 1. Visually inspect all joists for damage.
 - 2. Verify that the size and spacing of the joists being installed comply with the contract documents and approved shop drawings.
 - 3. Verify that proper joist bridging is being installed.
 - 4. Verify that the proper bearing at joist supports is provided.
 - 5. Visually inspect connections of joists to supports.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
- C. Visually inspect field welds according to AWS D1.1.
 - 1. In addition to visual inspection, test field welds according to AWS D1.1 and the following procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709.
 - c. Ultrasonic Testing: ASTM E164.
 - d. Radiographic Testing: ASTM E94.

- D. Visually inspect bolted connections.
- E. Prepare test and inspection reports.

END OF SECTION 05 21 00

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SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
 - 2. Noncomposite form deck.
- B. Related Sections:
 - 1. Cast-In-Place Concrete Section 03 30 00
 - 2. Structural Steel Framing Section 05 12 00

1.3 ACTION SUBMITTALS

- A. <u>Do not submit MSDS or SDS sheets with product data submittal.</u> Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of deck, accessory, and product indicated.
- C. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- D. Research Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 50, G60 zinc coating.
 - 2. Deck Profile: As indicated.
 - 3. Profile Depth: As indicated.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: Triple span or more (unless noted otherwise).

2.3 NONCOMPOSITE FORM DECK

- A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 60 (for 1.3 inch and shallower profiles or Grade 50 (for 1.5 inch and deeper profiles), G60 zinc coating.
 - 2. Profile Depth: As indicated.
 - 3. Design Uncoated-Steel Thickness: As indicated.
 - 4. Span Condition: Triple span or more (unless noted otherwise).

2.4 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbonsteel fasteners; or self-drilling, self-threading screws. See Drawings for allowable deck fasteners.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter, unless indicated otherwise on the Drawings.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth unless otherwise indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Roof sump pans: Fabricate from single piece of 14 gage galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1-1/2" below roof deck surface, unless otherwise shown or required by deck configuration.
- I. Galvanizing Repair Paint: ASTM A780.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck when indicated as such on the Drawings. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- J. End Bearing: Install deck ends over supporting frame with a minimum end bearing as indicated by SDI or manufacturer's requirements, whichever is more stringent.
- K. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and fasten flanges to top of deck. Space fasteners not more than 12 inches apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports.
- L. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- M. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- N. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- O. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.3 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
 - 1. Visually inspect the deck for damage.
 - 2. Verify that the deck depth, gauge, type, properties and finish comply with the contract documents.
 - 3. Verify that the deck attachment to the supporting steel is as specified in the contract documents.
 - 4. Verify that the proper deck support is used around openings.
 - 5. Verify that deck accessories are being installed according to the contract documents and approved shop drawings.
 - 6. Inspect welding of metal deck in accordance with AWS D1.3, including:
 - a. Verification of welding consumables.
 - b. Verification of welding procedure specifications.
 - c. Verification of welding personnel qualifications prior to welding operations.
 - d. Observation of the welding in progress.
 - e. Visual inspection of all complete welds.
 - 7. Inspect mechanically fastened metal deck, including:
 - a. Verification of the fasteners to be used prior to installation.
 - b. Observe fastening in progress to confirm installation is in conformance with manufacturer's recommendations.

- c. Visual inspection of the completed installation.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
- C. Field welds will be subject to inspection.
- D. Prepare test and inspection reports.

END OF SECTION 05 31 00

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SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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

1.2 SUMMARY

Α. Section Includes:

- Exterior non-load-bearing wall framing. 1.
- Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal 2. framing.
- 3. Ceiling joist framing.
- 4. Soffit framing.
- Β. **Related Sections:**
 - Section 05 05 19 1. **Post-Installed Anchors** Section 05 44 00
 - 2. Cold-Formed Metal Trusses

ACTION SUBMITTALS 1.3

- Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for Α. review of this information.
- Β. Product Data: For each product type.
- C. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- D. Delegated-Design Submittal: For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- Α. Qualification Data: For testing agency.
- Β. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports.
- Ε. Research Reports:

- 1. For nonstandard cold-formed steel framing from ICC-ES.
- 2. For power-actuated fasteners, from ICC-ES.
- F. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.
- 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."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Wall Framing (Unless Noted Otherwise): Horizontal deflection of 1/240 of the wall height.
 - b. Exterior Non-Load-Bearing Wall Framing (Brick Veneer): Horizontal deflection of 1/600 of the wall height.
 - c. Interior Non-Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
 - d. Ceiling Joist Framing: Vertical deflection of 1/360 of the span for live loads and 1/240 for total loads of the span.
 - Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Deflection tracks and vertical deflection clips shall be designed to accommodate 3/4" of movement in the primary steel structure.
 - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: 33 ksi for 43 mil and thinner, 50 ksi for 54 mil and thicker.
 - 2. Coating: G60, A60, AZ50, or GF30.
- B. Steel Sheet for Clips: ASTM A653, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60 or G90.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Base-Metal Thickness: As required by structural performance (0.0428 inch (18 gage) minimum)
 - 2. Flange Width: As indicated on Drawings or as required by structural performance.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As required by structural performance.
 - 2. Flange Width: As required by structural performance.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel joists.
 - 2. Flange Width: 1-5/8 inches, minimum.

2.6 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Base-Metal Thickness: As required by structural performance (0.0428 inch (18 gage) minimum)
 - 2. Flange Width: As required by structural performance.

2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- D. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- B. Cement Grout: Portland cement, ASTM C150, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.10 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-toline joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at 96-inch centers or as indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches or as indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at 96-inch centers or as indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed coldformed steel framing with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a qualified special inspector to perform the following special inspections:
 - 1. Visually inspect elements as follows:
 - a. 10% of stick-framed bearing wall construction and assemblies
 - b. 100% of all strap bracing, hold-down anchors and related connections
 - c. 100% of all shear walls, hold-down anchors and related connections
 - 2. Inspect framing member sizes, configuration and spacing.
 - 3. Verify material gauges meet indicated requirements.
 - 4. Verify proper material yield strengths.
 - 5. Verify proper connection materials are used (clips, brackets, etc.). Visually observe size, type, configuration and installation of fasteners. Verify proper engagement into connected materials.
 - 6. Visually inspect welding for size, quantity and quality.
 - 7. Verify framing assemblies are constructed to the configurations required and that all materials are provided for a complete assembly. Review installation of all permanent bridging and bracing.
 - 8. Verify proper alignment of supported elements on load-bearing walls, including assemblies requiring supported elements to be installed directly above supporting studs.
- B. Testing: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- C. Field and shop welds will be subject to testing and inspecting.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

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Advanced Systems Group Corporate Office 7625 Disalle Drive Fort Wayne, IN 46825 Phone: (260) 487-7814 Fax: (260) 484-1610

July 16th, 2024

Request for Clarification No 1:

Project Name: Wawasee Community Schools / Milford Elementary

Architect: Elevatus

Contractor: Advanced Systems Group 7625 DiSalle Blvd Fort Wayne, IN 46825

CONTRACTORS REQUEST FOR CLARIFICATION:

Door Access and Security

- 1) Drawing Set E-401 and E-402: Are there specifications for Door access or Door security in the provided documents? There are symbols for door contacts and card readers however there is no spec section regarding such items. Please Specify.
- Drawing Set E-605 Note 7 Door Intercom Riser Shows Aiphone Master Stations and Consoles however there is no specification section. Will Specs be provided? Please specify

AV Public Adress

- 1) AV spec 2.5 on page 27 51 16-3 does not have an amplifier specified. Only a basis of design of a manufacturer is given. Please specify model.
- 2) AV spec 2.7 on page 27 51 16-3 specifies (3) Shure QLX-D microphones. Please clarify how many belt pack transmitters, microphones for transmitters, and what handheld transmitter and capsule combinations are desired.
- 3) AV spec 2.7 on page 27 51 16-3 specifies (3) Shure QLX-D microphones with antenna distribution. Please clarify the manufacturer and model of the distribution system and remote antenna(s) with location(s) for the specified antenna(s)
- AV spec 2.8 on page 27 51 16-3 16-4 does not specify if the rack is to be free standing or wall mounted. There are no notes on the drawings to indicate what style of rack is needed. Please clarify the style of rack.



- 5) AV spec 2.8 D needs clarification on what style of power is needed. Please specify the proper power sequencing system to be installed
- 6) AV spec 2.9 on page 27 51 16-4 does not state what kind of paging system interruption is supposed to be provided. Please clarify manufacturer and part number
- 7) AV spec 2.10 on page 27 51 16-4 does not give a specific model of speaker, only a basis of design is given. Please specify the model number(s) required
- 8) Drawing sheet E-401 shows a projector in the gymnasium, but no spec is shown in the Division 27 specification section. Please clarify if this is for future use or current. If current, please specify make and model of projector along with lens, mounting hardware, and control preference
- 9) Drawing sheet E-401 shows an electric projection screen in the gymnasium but no spec is shown in the Division 27 specification section. Please clarify if this is for future use or current. If current, please specify make and model of screen along with control preference
- 10) There are no specs given for the cafeteria AV. Please provide specifications for this area.

Door Access

1) Door Access is by Owner vendor. Contractor shall provide inidcated power supplies and rough-in raceways per plans.

2) See addendum #3 for Specifications 281523 Intercom Entry Systems.

AV Public Address

1-7) See Addendum #3 for clarifications to Specifications 275116.

8) Projector in gym is by Owner. Power and data rough-in is by Contractor. See E-401 in Addendum #3 for additional information.

9) Projection Screen is by Owner. Power and control by Contractor.

10) See Addendum #3, E-402 and E-502 for additional information.





Advanced Systems Group Corporate Office 7625 Disalle Drive Fort Wayne, IN 46825 Phone: (260) 487-7814 Fax: (260) 484-1610

July 17th, 2024

Request for Clarification No 2:

Project Name: Wawasee Community Schools / Milford Elementary

Architect: Elevatus

Contractor: Advanced Systems Group 7625 DiSalle Blvd Fort Wayne, IN 46825

CONTRACTORS REQUEST FOR CLARIFICATION:

AV Public Adress

- 1) On drawing sheet E-502 there is shown four (4) wireless microphones in the system. The spec on page 27 51 16-3 says to provide three (3) units. Please clarify the correct quantity.
- 2) On drawing sheet E-502 there is a rack mount drawer shown in the equipment rack, but it was not listed in the spec. Please clarify if there is to be a rack drawer provided.
- 3) Spec page 27 51 16-4, section 2.11 A and B state to provide input plates according to drawings. There are no locations shown on the drawings. Please show locations on the drawings along with quantities.
- 1) See Addendum #3 for clarification.
- 2) Yes, 2U drawer required per detail.
- 3) See E-401, E-402 and Addendum #3 for clarification.



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WCSC Milford Elementary School

Milford, IN

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PART 1 - GENERAL

1.1 SUMMARY

- A. Provide labor, materials and equipment necessary to fabricate, transport and install precast concrete elements and accessories indicated on the Drawings and specified herein.
 - 1. Architectural precast concrete sills.
 - 2. Architectural precast copings.

1.2 SUBMITTALS

- A. All architectural precast concrete products specified in this Section shall be submitted as a single package as practicable. Separate submittals for each system or product may not be acceptable.
- B. Do not submit MSDS or SDS sheets with the product data submittal. Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Product Data: Submit manufacturer's specifications, data and instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.
- D. Samples: Submit one architectural precast sample panel 2' -0" wide minimum by 2' -0" high minimum showing the following typical conditions and details:
 - 1. Quality, color, and texture of surface finish.
 - 2. Edge details including chamfers.
 - 3. Clip angle anchors at bottom, vertical joints, and top anchor to structure.
 - 4. Architect's review of samples will be for color, texture, and general appearance of finished edges and surfaces. Compliance with other specification requirements is the exclusive responsibility of this Contractor.
 - 5. After Architect's review of sample, submit correct or additional sample to be used as Architect's Control Sample during construction.
 - 6. Submit (1) one control sample(s) for each type and color of architectural precast.
- E. Submit PCI Certification as specified in Article 1.3 herein.

F. PreInstallation conference meeting minutes including agenda and attendees.

G. Job-Site Mock-Up Panels:

1. Provide one (1) full size mock up panels located as directed by the CMc.

1.3 PREINSTALLATION MEETINGS

- A. Conduct the preinstallation meeting at the project site at least 4 weeks prior to setting precast panels and appurtenances. The following attendees are required:
 - 1. Owner and/or Owners Representative
 - 2. CMc
 - 3. Architect and/or Architect's Representative

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site.
- B. Store and protect products.
- C. Handle precast members in position consistent with their shape and design. Lift and support only form support points.
- D. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation and erection.
- E. Protect members to prevent staining, chipping, or spalling of concrete.

PART 2 - PRODUCTS

2.1 FORMWORK MATERIALS

A. Accurately construct forms, mortar-tight, and of sufficient strength to withstand pressures due to concrete placing operations and temperature changes. Maintain to provide complete precast concrete units of shapes, lines and dimensions indicated, within specified fabrication tolerances.

2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, latest edition, Type III.
 - 1. Use only one brand and type of cement throughout the Project, unless otherwise acceptable to Architect.
 - 2. Use standard "gray" portland cement for all precast concrete.
- B. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.
- C. Air-Entraining Admixture: ASTM C260, latest edition.
- D. Water-Reducing Admixture: ASTM C494, latest edition; Type A.
- E. Calcium Chloride: Do not use calcium chloride in precast or prestressed concrete.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116 and MNL 117.
- G. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

2.3 PROPORTIONING AND DESIGN OF MIX

- A. Design mixes may be prepared by an independent testing facility or by qualified precast manufacturing plant personnel, at precast manufacturer's option.
- B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for each type of concrete required, complying with the latest editions of ACI 211.1 or ACI 211.2.

- C. Standard Mix: Standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:
 - 1. Compressive Strength: 5,000 psi minimum at 28 days.
 - 2. Total Air Content: Not less than 4 percent nor more than 6 percent.
- D. Admixtures: Use air-entraining admixture in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.
 - 1. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.4 FABRICATION

- A. Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116, latest edition, unless otherwise indicated.
- B. Fabricate units straight, and true to size and shape, with exposed edges and corners precise and square unless otherwise indicated.
 - 1. Precast units which are warped, cracked, broken, spalled, stained, or otherwise defective will not be acceptable. Units not acceptable to the Architect shall be replaced by the contractor or precaster at no cost to the Owner.
- C. Anchorages: Provide loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other miscellaneous steel shapes not provided by other trades, necessary for securing precast units to supporting and adjacent members.
- D. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on the shop drawings.

2.5 FINISHING

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.
- B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- C. Submit a Control Sample to the Architect for approval. The submitted sample will be used for the Control Sample. Finish shall match Architect's Control Samples.
- C.D. Smooth formed finish with no fins, projections, inconsistencies or ragged edges. All lines shall be straight and true.

2.6 TOLERANCES

- A. Conform to PCI MNL-116 or MNL-117 latest editions, except as specified below:
 - 1. Spalling, chips, honeycombing, voids, bumps, busted or cracked edges, imperfections, or deformities will not be allowed.
- B. Architectural precast concrete tolerances shall be as follows in accordance with MNL-117, latest edition:

5.

1. Overall height and width of units measured at the face exposed to view:

a.	10 feet or under	±1/8 inch
b.	10 feet to 20 feet	+1/8 inch, -3/16 inch
C.	20 feet to 40 feet	±1/4 inch
d.	Each additional 10 feet	±1/16 inch per 10 feet

- Total thickness ±1/4 inch
 Length and width of blockouts and openings within one unit
- 3. Length and width of blockouts and openings within one unit $\pm 1/4$ inch 4. Bowing $\pm L/360$ maximum 1 inch
 - Bowing ±L/360 maximum 1 inch Local smoothness ¼ inch in 10 feet
 - othness ¹/₄ inch in 10 feet 6. Warping
 - 6. Warping 1/16 inch per foot of distance from nearest adjacent corner
- 7. Dimensions of architectural features and rustications $\pm 1/8$ inch

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erector must examine supporting structure and conditions under which precast concrete work is to be erected and notify Contractor in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with installation of architectural precast concrete units until unsatisfactory conditions have been corrected in a manner acceptable to Erector. Beginning of installation indicates that installer accepts existing conditions.

3.2 INSTALLATION

- A. Deliver anchorage items which are to be embedded in other construction before start of such Work. Provide setting diagrams, templates, instructions, and directions as required for installation.
- B. Do not install precast units until concrete has attained its design compressive strength.
- C. Install precast concrete members plumb, level, and in alignment within PCI MNL-27, latest edition, specified limits of erection tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as members are being permanently connected.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
- D. Accessories: Install clips, hangers, and other accessories required for erection of precast units to supporting members and back-up materials.
- E. Anchor units in final position by grouting, or as otherwise indicated. Remove temporary shims, wedges, and spacers as soon as possible after anchoring is completed.
- F. Sealant shall be installed in joints in accordance with sealant manufacturer's recommendations.
 - 1. Comply with requirements for elastomeric sealants specified in Section 07 92 00.
- G. Cleaning: Clean exposed facings to remove dirt and stains which may be on units after erection and completion of joint treatments. Wash and rinse in accordance with precast manufacturer's recommendations. Protect other work from damage due to cleaning operations. Do not use cleaning materials or processes which could change the character of exposed concrete finishes.
- H. Erection Tolerances:

- 1. Erect members level and plumb within allowable tolerances.
- 2. Conform to PCI MNL-116, latest edition.

I. Protection:

- 1. Protect members from damage caused by field welding or erection operations.
- 2. Provide non-combustible shields during welding operations.
- J. Provide all items and accessories as required for a complete and total installation in every respect.

3.3 PERFORMANCE REQUIREMENTS

- A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.
 - 1. Limitations as to the amount of patching which will be permitted is subject to acceptance by the Architect.
- B. In addition to above, in-place precast in units may be rejected for any one of the following:
 - 1. Exceeding the specified installation tolerances.
 - 2. Damaged during construction operations.
 - 3. Exposed-to-view surfaces which develop surface finish deficiencies.
 - 4. Other defects as listed in PCI MNL-116, latest edition.

END OF SECTION

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SECTION 04 22 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of unit masonry as shown on the Drawings and specified herein.
 - 1. The Work of this section also includes the installation of rigid cavity and/or continuous insulation. Refer to Section 07 21 00 for rigid cavity and perimeter insulations.
- B. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:
 - 1. Masonry mortar furnished under the Work of Section 04 05 13.
 - 2. Masonry grout furnished under the Work of Section 04 05 16.
 - 3. Masonry accessories furnished under the Work of Section 04 05 23.
 - 4. Anchor bolts, steel plates, and steel lintels; refer to Division 5.
 - a. Installation of lintels in masonry walls shall be included under the Work of this Section.
 - 5. Wood bucks and nailing blocks in masonry construction; refer to Section 06 10 00.
- C. Cooperate with other trades requiring items of equipment or services to be installed within or in conjunction with Unit Masonry Work.
- D. Other Materials provided and installed by this Section:
 - 1. Masonry cleaners
 - 2. Concrete slab protection.
- E. Products installed, but not furnished, under this Section include the following:
 - 1. Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."
 - 2. Manufactured reglets in masonry joints for metal flashing.
 - 3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

1.2 SUBMITTALS

- A. All unit masonry products specified in this Section shall be submitted as a single package as practicable. Separate submittals for each system or product may not be acceptable.
- B. Do not submit MSDS or SDS sheets with the product data submittal. Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Test report from independent laboratory showing result of efflorescent test conducted per ASTM C67 for each provided face brick type.

- D. Upon regular presentation within past 6 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on <u>net</u> area), and water absorption properties, as well as adherences to standards where so specified, for:
 - 1. Each proposed type of concrete masonry unit.
- E. A test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work for:
 - 1. Each proposed type and size of concrete masonry unit as required on the Reinforced Masonry Plans in the Drawings.
- F. Mock-up panels as erected on site grounds are only samples required.
- G. Approved manufacturer's published complete product data, with particular items to be provided clearly marked thereon, for:
 - 1. Proposed masonry cavity wall insulation
 - 2. Integral color
 - 3. Integral water repellant additive
 - 4.3. Preformed insulation inserts
- H. Submit minutes from preinstallation conference.
- I. Fire-rated CMU certification.
- J. Installer's examination report.
- K. Submit written masonry inspection reports as specified herein.
- L. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- M. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 2. Fabricated Flashing Details: Detail corner units, end-dam units, and other special applications.
 - 3. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
- N. Samples for Initial Selection: For the following:
 - 1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 - 2. Colored mortar Samples showing the full range of colors available.
- O. Samples for Verification: For the following:
 - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
 - 3. Stone trim samples not less than 12 inches in length, showing the full range of colors and textures expected in the finished construction.

- 4. Weep holes/vents in color to match mortar color.
- 5. Accessories embedded in the masonry.
- P. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- Q. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Each type of masonry unit required.
 - 2. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
 - 3. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 - 4. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 5. Each material and grade indicated for reinforcing bars.
 - 6. Each type and size of joint reinforcement.
 - 7. Each type and size of anchor, tie, and metal accessory.
- R. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:
 - 1. ACI 530/530.1 Building Code Requirements and Specifications for Masonry Structures and Relates Commentaries.
 - 2. NCMA-TEK 18-1A Compressive Strength Evaluation of Concrete Masonry.
 - 3. NCMA-TEK 3-2A Grouting Concrete Masonry Walls.
 - 4. NCAM-TEK 18-2A Sampling and Testing Concrete Masonry Units.
 - 5. ASTM C140 Standard test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - 6. NCMA-TEK 70A Concrete Masonry Prism Strength.
 - 7. NCMA-TEK 132
 - 8. <u>Comply with ALL NCMA-TEK Standards.</u>
- B. Changes in the source or brand of masonry materials during construction will require resubmission and re-testing at the Contractor's expense.
- C. Job Mock-Up

- 1. Prior to installation of masonry work, erect sample wall panel mock-up using materials, bond, and joint tooling shown or specified for final work. Provide special features as directed for caulking and contiguous work. Build mock-up at the site, where directed, of full thickness and approximately 4¢¢ x 4¢¢ 8' x 8', unless otherwise shown, indicating the proposed range of color, texture, and workmanship to be expected in the completed work. Erect panels with finish face of panels facing south. Obtain Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move, or destroy mock-up until work is completed. Provide mock-up panel for the following:
 - a. Typical exterior face brick wall.
 - b. Typical interior partition of concrete masonry units.
 - c. Typical exterior CMU wall indicating all of the different types of CMU and finishes as specified herein.
 - d. Uniformity of joints
- D. Concrete Masonry Inspection
 - 1. Refer to Division 01 for additional requirements.
 - a. Masonry inspection is required for those masonry elements where it is imperative that construction produces elements which can attain high design strengths. These masonry elements include, but are not limited to, grout filled CMU walls, CMU bearing walls, and grout filled and vertically reinforced CMU walls, and other walls as may be indicated on the Drawings.
 - b. <u>The Contractor will be responsible for the masonry inspections. Masonry inspections shall be by an independent laboratory as specified in Division 01.</u> <u>Submit reports as specified herein.</u>
 - 2. Submit written reports for each section of wall inspected to include:
 - a. Project identification name and number.
 - b. Name of Masonry Contractor.
 - c. Name of inspecting service.
 - d. Date of report.
 - e. Specific location of work inspected.
 - f. Horizontal joint reinforcing size, type, spacing, and lap.
 - g. Preparation of cores and cavities to be grouted. Inspect every core and cavity.
 - h. Vertical reinforcing centering clip size, type, spacing, and proper alignment.
 - i. Size spacing and lap of vertical reinforcing and installation in centering clips.
 - j. Installation and vibration of grout in cores and cavities.
 - k. Remarks as to general conditions pertinent to the strength and quality of the masonry work.
 - 3. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
 - 4. <u>The masonry inspection agency shall be selected prior to the pre-masonry conference and</u> shall have the inspector who will inspect this project attend the conference.
 - 5. <u>The contractor for the work of this Section shall be responsible for the masonry</u> inspection to be performed by an independent testing laboratory.
 - **6.** Frequency of masonry inspections shall be as defined herein.
- E. Fire Performance Characteristic: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means acceptable to authorities having jurisdiction.
- F. Definitions:
 - 1. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.
 - 2. CMU: Concrete masonry unit.

- G. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- H. <u>Pre-Installation Conference</u>: Conduct an on-site pre-installation conference prior to beginning masonry work on the project. Masonry contractor and all parties shall attend. Refer to Division 01 for additional requirements. Notify Architect 14 days prior to pre-installation conference. Suggested agenda as follows:
 - 1. All of the contractor's masonry submittals shall be previously submitted, completed and reviewed by the Architect prior to the Pre-Installation Conference.
 - 2. Locations of load-bearing walls.
 - 3. Locations of CMU control joints.
 - 4. Contractor's concern for missing/incomplete details.
 - 5. Verify use of up-to-date plans/specifications.
 - 6. Contractor's responsibility for temporary wall bracing.
 - 7. Installation procedures.
 - 8. Coordination issues with other trades.
 - 9. Protection of concrete floors during masonry installation.
 - 10. Open issues/concerns.
 - 11. Job-site storage and staging areas
 - 12. Mortar dropping concerns on exposed concrete floors in the Dayrooms and Booking.
 - 13. Concrete slab protection during construction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.5 TESTS OF CONCRETE MASONRY PRISMS

- A. For grout filled and reinforced or un-reinforced concrete masonry wall construction tests for the compressive strength of prisms as described in ASTM E 447, latest edition and NCMA-TEK 70A.
 - 1. Provide a minimum of one set of 3 masonry prisms for testing per each 5000 square feet of masonry wall construction.
- B. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of Testing service, name of material suppliers, specific location where masonry represented by the prism is used, test results, and values specified in the referenced specification. Indicate whether tested prism is acceptable for intended use.
- C. If the compressive strength tests fail to meet the minimum requirements specified, the concrete masonry represented by such tests shall be considered deficient in strength.

D. Deficient masonry construction shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu or removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

1.6 PROJECT CONDITIONS

- A. Protect partially complete masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane at least 2 foot down both sides of walls and anchor securely in place.
- B. Protect partially complete masonry walls against wind damage by bracing as required until support of walls is integral with the building structure.
- C. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F and falling. Heat materials and provide temporary protection of complete portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes on Brick.
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.
- E. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
 - 1. Do not lay masonry units that are wet or frozen.
 - 2. Remove masonry damaged by freezing conditions.
- F. Hot-Weather Construction: Comply with referenced unit masonry standard.

1.7 MASONRY INSPECTION

- A. The Contractor's testing agency is responsible for all masonry inspections and reports as specified herein.
- B. Provide masonry construction inspection of concrete masonry walls indicated as requiring inspection on the drawings to ensure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths, such as, but not limited to, vertically reinforced grouted CMU walls, grouted CMU wall, and load-bearing CMU walls.
- C. Qualification of Inspection Agency: Refer to Division 1 requirements.
- D. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
- E. The individual or individuals who will perform the masonry inspection shall be present for the Premasonry Conference.
- F. <u>The masonry inspector shall prepare a written report or reports for each day of inspection.</u>

G. The masonry inspector shall be present and observe all grouting operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to ensure its conformance to the contract Documents and that grouting may proceed. Periodically, the masonry inspector shall be present during the placing of masonry units and reinforcement. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

1.8 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths (fm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 1. For Concrete Unit Masonry: f'm = 2000 psi.
 - 2. For Brick Unit Masonry: f'm = 3000 psi.

1.9 CONCRETE SLAB PROTECTION

- A. Protect all new concrete floors scheduled to be sealed that are directly under and adjacent to CMU walls. Mortar droppings on concrete floors scheduled to be sealed will not be allowed. Discuss this requirement at the Preinstallation Meeting.
- B. Mortar stains on concrete floors shall be removed in their entirety prior to concrete floor sealer final installation and buffing installation. Refer to Section 03 35 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 MASONRY UNITS

- A. Obtain masonry units from one manufacturer for uniform texture and color for each kind required, for each continuous area and visually related areas.
- B. Concrete Masonry Units (CMU) (NOTE: All CMU on this <u>PROJECT</u> to have minimum compressive strength of 2800 psi on <u>net area</u> per ASTM C90.)
 - 1. CMU Manufacturer: Shall be member of the National Concrete Masonry Association.
 - 2. Size: Manufacturer's standard units with face dimensions of 15-5/8 by 7-5/8 inches (actual), and other sizes as may be indicated on the drawings and details.
 - 3. Special Shapes: Provide, where shown and where required, lintels, inside and outside corners, jambs, sash, control joints, headers, bond beams, bullnoses, and other special conditions.
 - a. Provide bullnose corners at all exposed external corners (except at heads), and sills.
 - 4. Hollow Load-Bearing (HL) CMU: Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 2800 psi on the net section.

- 5. Solid Loadbearing CMU (Solid CMU): Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 2800 psi on the gross section.
- 6. Normal Weight Units: ASTM C33 concrete aggregates for a dry net weight of not less than 125 pounds per cu. ft. Strength shall be as indicated above.
- 7. Curing: Cure units in a non-moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C90, Type II.
- 8. Exposed Face:
 - a. Manufacturer's standard color and texture. Smooth face.
- 9. Where CMU walls are indicated as fire-rated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means as acceptable to authorities having jurisdiction.
- 10. Fire Rated CMU shall meet requirements of the UL 618 and may be lightweight block manufactured with 100% rotary kiln produced expanded shale, clay, or slate. Blending of screenings or any other deleterious substance which impairs the fire rating is prohibited. The producer of the CMU shall furnish a one page certification showing conformance with all requirements of UL 618.
- 11. Provide masonry lintels at all openings greater than 1'-0" in width that occur in CMU walls unless indicated to be steel on the drawings.
- 12. All vertical wall corners (exposed corners) and window and opening jambs shall be bullnose CMU. 1-inch radius corners.
- C. Face Brick
 - 1. Quality Standard: ASTM C216, latest edition, Grade SW for exterior exposure, Type FBX.
 - 2. Size
 - a. Face brick shall be Standard Modular size.
 - b. Other special sizes as may be required or indicated for a total and complete installation in every respect.
 - 3. Manufacturer
 - a. **TYPE 1**: Belden Brick #8632
 - b. **TYPE 2**: Belden Brick "Sienna Blend Velour".
 - c. **TYPE 3**: Belden Brick "Desert Sun Velour".
 - 4. Provide special molded shapes and solids as required. No brick holes shall be visible in the final product.
 - 5. Compressive Strength: Shall exceed 3000 psi when tested with the loads applied normally to the bedding surface.
 - 6. Water Absorption: Average maximum water absorption by submersion in boiling water for 5 hours shall be less than 17 percent. Average saturation coefficient shall be less than 0.78.
 - 7. The Contractor for this Section of the Work shall include in the Base Bid the cost for solid brick required, the cost for cutting of brick required, the cost for cutting of brick required to obtain special shapes, the cost of special size brick required, and the cost of special molded shapes required.
 - 8. Bond Pattern: Flemish Bond

2.3 CAVITY WALL INSULATION

- A. Extruded Polystyrene Insulation: Rigid polystyrene board. Insulation shall be 2 inches thick or as indicated on Drawings, and have an aged "R" value of 10. Cavity wall insulation shall conform to ASTM C578, latest edition, Type IV.
 - 1. "Styrofoam-SM": Dow Chemical

- 2. "Foamular 250": UC Industries, Inc.
- 3. "Certifoam": DiversiFoam Products.
- B. Mastic: Shall be equal to Contech Brands "PL200" or H.B. Fuller "Maxbond" for application to outside face of inner wythe of cavity walls.
- C. Sealant: Shall be equal to Contech Brands "PL300" for sealing insulation joints and penetrations.

2.42.3 PREFORMED INSULATION INSERTS

- A. U-shaped, preformed insulation inserts shall be expanded polystyrene preformed and individually molded with a minimum density of 1 pcf, and shall conform to ASTM C578, latest edition, Type I. Install in CMU block at producers plant.
- B. Manufacturer: ÓÓKorfil U-Shaped Concrete Block Insulating Systems by Concrete Block Insulating Systems, West Brookfield, MA.
- C. Shape: U-shaped insert accomplishing compression fit with inside faces of both the front and rear face shells and the central web of the CMU allowing re-bar placement at center of CMU core, and handhold access at center web of the CMU.

2.52.4 MASONRY CLEANERS

- A. "NMD 80" buffered-detergent based solution for new masonry as manufactured by EaCo Chem, Inc., New Castle, PA; "EK 2010" by Prosoco, Inc., or Architect approved equal.
- B. Clean concrete masonry (CMU) by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.

2.62.5 SOURCE QUALITY CONTROL

A. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140, latest edition.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. Frozen Materials and Work: Do not use frozen materials mixed or coated with ice or frost. For masonry, which is specified to be wetted, comply with the BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
- G. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with construction tolerances of referenced unit masonry standard.
- B. CMU shall comply with NCMA-TEK standards.
- C. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10", or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.
- D. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.
- E. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
- F. Variation in Cross-Sectional Dimensions: For columns and thicknesses of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".
- G. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8"

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
 - 1. For the first and second block courses above and below apertures, run reinforcing continuous or extend two feet back from aperture edge. Refer to notes on Structural drawings.
- C. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide a caulk or insulation filled joint between top of masonry and the structural roof deck, structural steel framing or structural floor deck. Stop masonry a minimum of 1/2 inch from vertical, horizontal and sloped steel surfaces.
- D. Pattern Bond CMU: Lay concrete masonry units (CMU) in ½ running bond. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Lay masonry with vertical joints plumb, one above the other.
- E. Pattern Bond Face Brick: Lay face brick in Flemish Bond..
- F. Weight Requirements for CMU Units:
 - 1. Normal Weight: All CMU.
- G. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- H. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
 - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - 2. WHere built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
 - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
 - 4. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
 - 5. Fill jambs and heads of all hollow metal door and window frames installed in CMU or concrete walls solid with grout.
 - 6. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 07.
 - 7. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.
- I. Intersecting Masonry Walls: Where interior non-load-bearing masonry partition or wall intersects interior load-bearing masonry wall at 90 degrees, stop horizontal joint reinforcing in interior partition 4 inches short of intersection. Horizontal joint reinforcing in interior load-bearing wall shall run continuous. In the same courses as horizontal reinforcing, install wire mesh extending 8 inches minimum into interior partition and projecting into the exterior wall to within 2 inches of exterior face of wall. Install wire mesh reinforcing in horizontal joints 16 inches o.c. vertically.

- J. Grout masonry walls where indicated on drawings.
- K. Installing New Masonry in Existing Masonry Wall Construction:
 - 1. For alignment of faces of adjacent existing exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.
 - 2. Special requirements may be required for shoring and bracing of existing masonry wall construction and new masonry walls in existing masonry wall construction.
 - 3. It is the Masonry Contractor's full responsibility to design and erect the shoring and bracing system for masonry walls. If structural calculations are required to determine the shoring and bracing requirements for masonry walls, the Masonry Contractor is responsible for obtaining that information which must be reviewed by the Architect¢¢s Structural Engineer.
 - 4. All shoring and bracing shall comply with OSHA requirements.
 - 5. Shoring and bracing shall comply with the Standard Practice for Bracing Masonry Walls under Construction, latest edition, as published by the Masonry Contractor¢¢s Association of America (MCAA) and Masonry Wall bracing Handbook, latest edition.
 - 6. Shoring and bracing is identified and defined as means and methods which is the full responsibility of the Contractor. Owner and Architect are held harmless.

3.5 MORTAR BEDDING AND JOINTING

- A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Each mortar batch is allowed only one re-tempering. Do not use mortar which has begun to set after the first re-tempering or if more than 2-1/2 hours has elapsed since initial mixing.
- B. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints.
- C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
- D. Joints: Maintain joint widths shown, except for minor variations required, to maintain joint alignment. Lay walls with 3/8 inch joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:
 - 1. Fill Exposed Joints: Concave tooled.
 - 2. Fill Concealed Joints: Struck flush.
- E. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jams to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.6 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.
- B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 - 1. Provide continuity with horizontal joint reinforcement at corners using prefabricated "L" units, in addition to masonry bonding.

- C. .Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
 - 1. Provide individual metal ties.
 - 2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
 - 3. Install pressure-relieving joint filler in joint between top of partition and underside of structure above.
 - 4. Wedge nonbearing partitions against structure above with small pieces of tile, slate, or metal.

3.7 CAVITIES/AIR SPACES

- A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.
- B. Tie exterior wythe to interior wythe with individual metal ties. Stagger alternate courses.
- C. Tie exterior wythe to interior wythe with continuous horizontal joint reinforcing embedded in mortar joints at not more than 16 o.c.
- D. Install vents in vertical head joints at the top of each continuous cavity/air space. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated.

3.8 CAVITY WALL INSULATION

- A. On units of rigid insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face or attach to inside face with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 - 1. Fill all cracks and open gaps at all perimeter edges in insulation with crack sealer compatible with insulation and masonry.

3.93.8 HORIZONTAL JOINT REINFORCEMENT

- A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturers for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- B. Space continuous horizontal reinforcing as specified in Section 04 05 23.
- C. Reinforce masonry openings greater than 1 foot wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8 inches apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2 foot beyond jambs of the opening except at control joints.
- D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.103.9 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. Install control and expansion joints in unit masonry where indicated, or if not indicated, space at a maximum of 25'-0" o.c. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
 - 2. Install preformed control joint gaskets designed to fit standard sash block.
 - 3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with 3/8-inch expansion joint filler sheets (column isolation). Secure with light gauge wire. Refer to Section 04 05 23 for column isolation specifications.

3.113.10 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.123.11 FLASHING/WEEP HOLES

- A. Install embedded flashing and weep holes in exterior wythe face brick and exterior stone cladding masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Install flashings as follows at exterior Face Brick wythe and Exterior Stone Cladding:
 - 1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.

- 2. At heads and sills and where flashing is interrupted, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
- 3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.
- 4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer and seal and lap with adhesive as recommended by the flashing manufacturer.
- 5. Install brick vents in the head joints of the second brick course above each flashing and the third course of brick below each flashing and spaced at a maximum of $4\phi 0$ o.c. horizontally.
- C. .Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:
 - 1. For weep holes with product specified in Part 2 of this Section.
 - 2. Space weep holes 16 inches o.c.
 - 3. In un-insulated cavities/air spaces place pea gravel to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
 - 4. In insulated cavities/air spaces cover cavity/air space side of open weep holes with copper or plastic insect screening before placing loose-fill masonry insulation in cavity.
- D. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.
- E. Provide concealed flashing in the first in the first course above grade. Provide concealed flashing at other locations in masonry work as shown. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/4 inch beyond face of wall and bend down at 45 degree angle to create a drip edge, unless otherwise shown. Extend flashings beyond edges of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings, spaced 16 inches o.c.
 - 1. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2 inches and seal lap with elastic sealant, or in accordance with manufacturer's instructions.

3.133.12 VERTICAL REINFORCED CONCRETE MASONRY

- A. Where grout filled or steel reinforced concrete block masonry foundations or masonry walls are called for on the Drawings, they shall be reinforced and grouted in accordance with the Drawings and details. All cells to be grouted shall be clean and free of mortar protrusions and droppings in the cells.
- B. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 23A Grouting for Masonry Walls. Maximum height of grouting shall be 4 feet.
- C. 1500 psi 2000 psi 3000 psi grout shall be installed in the block cavities so as to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall <u>not</u> be used as grout for CMU.
- D. After the grout is placed, it shall be consolidated with a small vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block, except for the top course in the wall where the grout shall be struck flush with the top. If highly absorptive masonry units are used, the grout shall be re-vibrated after it has begun to stiffen.

- E. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity. Water-cement ratio shall be maintained so compressive strength at 28 days shall not be less than 2000 lbs. per sq. in.
- F. Caging devices and centering clips shall be spaced vertically such that every section of vertical reinforcing steel bar is restrained by 2 clips or devices, one near its top and one near its bottom.

3.143.13 LINTELS

- A. Install steel lintels where indicated and/or as required for masonry openings.
- B. For CMU walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout, or as may be indicated on the Structural Drawings.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.153.14 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.163.15 ANCHORING MASONRY WORK

- A. Provide anchoring devices of the type shown and as specified.
- B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
 - 1. Provide an open space not less than 1/2 inch width between masonry and structural member, unless other types of anchoring devices are shown. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless other types of anchoring devices are shown.
 - 3. Space anchors as shown, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.
 - 4. The ends of wall ties shall be embedded in mortar joints. Wall tie ends shall engage outer face shells of hollow units by at least 1/2 inch. Wire wall ties shall be embedded at least 1-1/2 inch into the mortar bed of solid masonry units or solid grouted hollow units.
 - 5. Unless otherwise required, wythes not bonded by headers shall be bonded with wall ties as follows:
 - a. Size Minimum number of ties required
 - b. #9 gauge One wall tie wire per 2.67 sq.ft.

- c. 3/16 inch diameter One wall tie wire per 4.50 sq.ft.
- 6. Uless accepted by the Architect/Engineer, reinforcement shall not be bent after being embedded in grout or mortar.
- 7. Unless otherwise required adjustable ties shall meet the following requirements:
 - a. Use one tie for each 1.77 sq.ft. of wall area.
 - b. Neither horizontal nor vertical spacing shall exceed 16 inches.
 - c. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 inch.
 - d. Maximum clearance between connecting parts of the ties shall be 1/16 inch.

3.173.16 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.
 - 6. Clean all exposed concrete masonry of efflorescence in strict accordance with NCMA TEK 8-3A.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 07 21 00 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of insulation:
 - 1. Miscellaneous stuffing insulation. (Mineral wool only)
 - 2. Un-faced batt insulation.
 - 3. Sound attenuation blankets.
 - 4. Rigid cavity wall and perimeter insulation.
 - 5. Spray-foam insulation (misc. locations as may be indicated. Spray-foam insulation is not acceptable for use as miscellaneous stuffing insulation or any other insulations as specified herein).
 - **5.6**. Spray-foam insulation for use under metal deck roof sump pans.
- B. Rigid roof insulation and cover board specified in Section 07 22 00 for Roof and Deck Insulation.
- C. All insulation shall be formaldehyde-free.
- D. Contractor Option: Mineral wool insulation is acceptable for all insulations specified herein.

1.2 SUBMITTALS

- A. All building insulation items and accessories specified in this Section shall be submitted as a single package as practicable. Separate submittals for each system or product may not be acceptable.
- B. <u>Do not submit MSDS or SDS sheets with the product data submittal.</u> Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Submit complete manufacturers installation instructions for each type of insulation as specified.
- D. Submit complete product data for each material proposed to be provided.
- E. Submit manufacturer's certificate certifying that insulation meets or exceeds specified requirements.

1.3 QUALITY ASSURANCE

- A. Insulation shall be legibly marked with the following data:
 - 1. Its "R" value per inch and the mean test temperature.
 - 2. The manufacturer's name.
 - 3. The insulation type and its trade name.
 - 4. Water vapor transmission (perm inch average).
 - 5. UL rating flame spread, fuel contribution, smoke developed (ASTM E84 and D1692).
- B. The "R" values indicated are for the insulation tested at 75 degrees F mean temperature. It shall be for the total thickness of the insulation and shall exclude surface resistance. Manufacturers shall certify that their insulation complies with these requirements.

- C. Insulation delivered to the job without this identification or being less efficient than the insulation specified will be rejected.
- D. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.
- E. Toxicity/Hazardous Materials
 - 1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
 - 2. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS STUFFING INSULATION (MINERAL WOOL ONLY)

- A. Shall be inorganic (non-asbestos) mineral wool insulation without facing, for the purpose of filling and stuffing openings in walls around pipes, structural components, conduits, expansion joints to eliminate noise transfer and to insulate. Use to seal top of interior walls, not fire rated walls, between masonry and roof deck, or as otherwise indicated. Use at expansion joints as detailed or as otherwise indicated. Insulation shall have a flame spread rating of 5 or less, and a smoke development rating of 0; per ASTM E84. Approved manufacturers are as follows:
 - 1. "Industrial Bulk Wool" packing wool fibers by Owens-Corning Thermafiber Corporation, Wabash, IN.
 - 2. Rock Wool Manufacturing Company, Leeds, Alabama.

2.2 UN-FACED BATT INSULATION

- A. Un-faced and kraft-faced preformed <u>formaldehyde-free</u> glass fiber unfaced batt insulation conforming to ASTM C665, Type I, and kraft-faced batt insulation conforming to ASTM C665, Type II, Class C, Category 1. Kraft-face shall be manufacturers standard. Insulation sized to the appropriate stud size. Approved manufacturers are as follows:
 - 1. "Formaldehyde-Free Fiberglass Insulation" by JohnsManville, Denver, CO.
 - 2. "EcoBatt" by Knauf Insulation, Shelbyville, IN
 - 3. "EcoTouch Pink" by Owens Corning Insulating Systems, Toledo, OH
 - 4. "CertaPro" by CertainTeed, Saint-Gobain, Malvern, PA

2.3 SOUND ATTENUATION BLANKETS

- A. Sound attenuation blankets shall be <u>formaldehyde-free</u> unfaced glass fiber insulation conforming to ASTM C665, Type I. Blankets shall be held in place by clips as recommended by the manufacturer. Flame spread shall be 25, smoke developed 50 in accordance with ASTM E136 and ASTM C84. Insulation sized to the appropriate stud size. Approved manufacturers are as follows:
 - 1. "Cavity-Shield Fiberglass" by JohnsManville, Denver, CO
 - 2. "EcoBatt" by Knauf Insulation, Shelbyville, IN
 - 3. "Pink Next Gen" by Owens Corning Insulating Systems, Toledo, OH
- 2.4 INSULATION FASTENERS (as may be required for insulation installation in metal stud walls)
 - A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Adhesively Attached, Spindle-Type Anchors:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchor:
 - a. Gemco; 90-Degree Insulation Hangers.
 - 3. Insulation-Retaining Washers:
 - a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
 - 4. Insulation Standoff:
 - a. Gemco; Clutch Clip.
 - 5. Anchor Adhesives:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.
 - B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

- 1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inchthick by 2 inches square.
- 2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch in diameter, length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inchessquare or in diameter.

- 1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Crawlspaces.
 - b. Ceiling plenums.
 - c. Attic spaces.
 - d. Where indicated.

2.5 CONTINUOUS RIGID CAVITY WALL ANSD RIGID PERIMETER INSULATIONS

- A. Extruded polystyrene rigid insulation shall conform to ASTM C578, latest edition, Type IV, minimum 25 psi compressive strength. Board edges shall be tongue and groove. Thickness shall be 2" 2.50-inches, or as otherwise indicated. Refer to the Drawings and details. Minimum aged R value of 5.0 per inch @75°F mean temperature per ASTM C518. Approved manufacturers are as follows:
 - 1. "Styrofoam Cavitymate" for cavity wall by Dow DuPont de Nemours, Inc., Midland, MI
 - 2. "Foamular 250" by Owens-Corning Insulating Systems, Toledo, OH
 - 3. "GreenGuard GG25-LG XPS" by Kingspan, Atlanta, GA

2.6 SPRAY-FOAM INSULATION (MISCELLANEOS LOCATIONS)

- A. Closed-cell spray-foam insulation "Proseal LE" by leynene, Ontario, CanadaHuntsman Building Solutions, The Woodlands, TX; or Architect approved equal. or "JM Corebond IV" by Johns-Manville; "Spraytite" by BASF; or "SealTite Pro" by Carlisle Spray Foam Insulation.
- A. B. Two component thermal insulation consisting of plastic resin and catalyst foaming agent surfactant with compressed air to product a cold-setting foam.
- 2.7 SPRAY-FOAM INSULATION (FOR USE ON THE BOTTOM SIDE OF ROOF DECK SUMP PANS)
 - A. Closed-cell spray polyurethane foam (SPF), two-component. For use on the bottom side of roof deck sump pans.
 - B. Acceptable Manufacturers
 - 1. "JM Corebond 2.8" by Johns-Manville
 - 2. "NCFI Spray Foam System 10-011" by NCFI Polyurethanes, Mount Airy, NC
 - C. Technical Properties:
 - 1. Core Density per ASTM 1622:
 - 2. Compressive Strength per ASTM D1621:
 - 3. Closed Cell Content per ASTM D6226;
 - 4. Flame Spread Index per ASTM E84:
 - 5. Smoke Developed per ASTM E84:
 - 6. Class A rated @2" per ASTM E84.

2.8 pcf 50 - 54 psi. greater than 90% less than 20 650

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare surfaces and areas to receive insulation material as required by the manufacturer. Do not install materials in unsatisfactory areas or to improperly prepared surfaces.

3.2 GENERAL INSTALLATION

- A. Coordinate application of insulation with the appropriate building trades involved.
- B. The installer doing the insulation work shall furnish adhesives or attaching means, if required, so that insulation material will be properly held in alignment and permanently attached to the surfaces which they are to be applied without damaging surface.
- C. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- D. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- E. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- F. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- G. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- H. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
- I. Provide all items and accessories as required for a complete installation in every respect.

3.3 MINERAL WOOL INSULATION

A. Where the Drawings call for interior walls to extend to deck or roof, openings in walls between rooms above the ceiling shall be sealed with mineral wool placed or stuffed in openings to eliminate noise transfer and air movement. Mineral wool insulation shall be provided at other building locations indicated or requiring minor fill to eliminate air movement.

3.4 BATT INSULATIONS

- A. Install in areas as indicated. Install in strict accordance with the manufacturers written installation instructions. Install in all exterior wall voids, behind beams, and concealed locations in the exterior walls and roof areas of the building whether or not indicated. All gaps shall be filled with batt insulation.
- B. Install thermal insulation as follows:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.

- 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- 4. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch (16-gage) diameter tie wire and inserted through slot in web of member.
- C. All voids in the perimeter of the building shell shall be filled and closed with miscellaneous mineral wool stuffing insulation, whether or not indicated or shown. This includes behind all steel beams, wide flange beams, channels, CMU, miscellaneous framing, etc.

3.5 CAVITY WALL INSULATION

- A. On units of rigid insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face or attach to inside face with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 - 1. Fill all cracks and open gaps at all perimeter edges in insulation with crack sealer compatible with insulation and masonry.

3.53.6 CLEAN UP

A. Clean up all wrappings, scrap, and cut material waste at the end of each days' work. Refer to Division 1 for additional requirements.

3.63.7 GENERAL INSTALLATION PROVISIONS

- A. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- D. Recheck measurements and dimensions, before starting each installation.
- E. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

3.73.8 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

WCSC Milford Elementary School Milford, Indiana

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SECTION 07 27 29 - AIR BARRIER COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes non-permeable, fluid-applied, air-barrier coatings.
- B. Non-permeable air barrier coating shall be used at exterior wall construction consisting of CMU.

1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 SUBMITTALS

- A. All items and accessories specified in this Section shall be submitted as a single package as practicable. Separate submittals for each system or product may not be acceptable.
- B. <u>Do not submit MSDS or SDS sheets with the product data submittal.</u> Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Product Data: For each type of product.
- D. Shop Drawings: For air-barrier assemblies.
- E. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 1. Include details of interfaces with other materials that form part of air barrier.

- F. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.
- G.F. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- H.G. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection by Contractor's testing agency of air barrier before external insulation and cladding are installed.
 - b. If Architect or Contractor determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
 - Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - **3.4**. Mock-up may become part of the Work.
- C. Thermography Test: If manufacturers technical inspector for the air barrier does not accept the Work, the Contractor shall test the completed building using infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90. Determine air leakage pathways using ASTM E1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems and perform corrective work as necessary to achieve the whole building air leakage rate as specified.
- D. Air Leakage Rate Test: If manufacturers technical inspector for the air barrier does not accept the Work, the Contractor shall test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft2 at a pressure differential of 0.3" water gauge (w.g.) in accordance with ASTM E779 (2003) or E1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft2 @ 0.3" w.g. Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with the air barrier manufacturers installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.
- **D.E.** Manufacturer of air barrier coating system shall inspect and accept the system installation, in writing, prior to covering up the air barrier coating system.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Contractor shall engage a qualified testing agency to perform preconstruction testing on field mockups.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
- B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.
- C. Low-Emitting Materials: Air barriers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 283.

2.3 NON-PERMEABLE, AIR-BARRIER COATING

- A. Non-Permeable, Air-Barrier Coating: Synthetic acrylic membrane
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. "ExoAir 130" and "ExoAir 110AT" by Tremco, Beachwood, OH
- b. "Perm-A-Barrier NPL 10/NPL 10 LT" and "Perm-A-Barrier Detail Membrane" by GCP Applied Technologies, Cambridge, MA
- c. "Air-Shield LM" by W.R. Meadows, Hampshire, IL
- d. "Barritech NP" by Carlisle, Carlisle, PA
- 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Minimum 5.7 perms; ASTM E 96/E 96M.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C
 - d. 66 70 mils WFT on CMU 31 35 mils DFT on CMU

2.4 ACCESSORY MATERIALS

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete airbarrier assembly and compatible with primary air-barrier material.
- B. Primer: Liquid waterborne or solvent-borne primer recommended for substrate by air-barrier material manufacturer.
- C. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade. In accordance with the manufacturer's written installation instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by airbarrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

3.4 TRANSITION STRIP INSTALLATION

- A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

3.5 AIR-BARRIER COATING INSTALLATION

- A. General: Apply air-barrier coating to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply air-barrier coating within manufacturer's recommended application temperature ranges.
- B. Air-Barrier Coatings: Apply a continuous unbroken air-barrier coating to substrates according to the following thickness. Apply an increased thickness of air-barrier coating in full contact around protrusions such as masonry ties.
 - 1. Vapor-Retarding, Air-Barrier Coating: Total dry film thickness as recommended by the manufacturer.
 - 2. Apply additional coats as needed to achieve void- and pinhole-free surface.
- C. Apply strip and transition strip according to air-barrier manufacturer's written instructions.
- D. Do not cover air barrier until it has been tested and inspected by Contractor's testing agency.
- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air-barrier system has been provided.
 - 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 6. Surfaces have been primed, if applicable.
 - 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 8. Strips and transition strips have been firmly adhered to substrate.
 - 9. Compatible materials have been used.
 - 10. Transitions at changes in direction and structural support at gaps have been provided.
 - 11. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 - 12. All penetrations have been sealed.
- C. Tests: As determined by Contractor's testing agency from among the following tests:
 - 1. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.
- D. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- F. Refer to Article 1.7, Quality Assurance, herein.

3.7 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by airbarrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction. C. Remove masking materials after installation.

END OF SECTION

SECTION 07 54 00 - FULLY ADHERED PVC SHEET ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of fully adhered PVC membrane roofing system indicated on the Drawings and as specified herein.
- B. Duro-Last, Saginaw, MI is WCSC Design Standard.

1.2 SUBMITTALS

- A. All PVC roofing materials, flashing and accessories specified in this Section shall be submitted as a single package as practicable. Separate submittals for each system or product may not be acceptable.
- B. <u>Do not submit MSDS or SDS sheets with the product data submittal.</u> Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Submit product data in accordance with Division 01 requirements, to substantiate that the products being installed are as specified. Product data shall be submitted so that it can be established that the roofing subcontractor has clear understanding as to what was specified.
- D. When warranties are delivered to the Owner, a cover letter shall be included directing the Owner to inform (copy) the manufacturer as well as the Roofing Contractor when reporting roofing problems, regardless of when they occurred during the warranty period.
- E. Contractor shall submit shop drawings for ordering, manufacturing, and final inspection of the Roofing System. Drawings shall include roof outline, roof dimensions, roof penetrations, insulation type and thickness, piece layout, parapet size and location, and other information which may affect the suitability and installation of the Roofing System on the respective project.
- F. Pre-roofing conference meeting minutes.
- G. Roof inspection and maintenance manual.
- H. Copies of each roof inspection as conducted by the manufacturer's representative.
- I. Submit warranties as specified.

1.3 QUALITY ASSURANCE

A. Roofing Contractor shall obtain from the roofing manufacturer copies of each roof inspection and furnish a copy to the Architect. Contractor shall inform roofing manufacturer, with regard to warranties, that warranties shall be issued, based upon the acceptance of the roofing work, and that deficiencies noted on inspection reports have been corrected. Manufacturer shall not refuse or restrict the provisions of its warranty, based upon deficiencies noted on inspection reports, especially any report that may not have been furnished to Architect. Architect will not approve final payment of roofing work until final and interim inspection reports and warranty are in hand. Architect's representative shall accompany manufacturer's inspector and Roofing Installer during final inspection before issuing manufacturer's warranty.

- B. Roofing firm (installer) and roofing membrane manufacturer shall have a least 10 years successful experience in the type of roofing system specified. <u>Roofing contractor shall be approved and trained specifically by the membrane manufacturer in the installation of the fully adhered PVC membrane roofing.</u>
- C. Project Foreman/Supervisor: Roofing installer shall have on the job whenever roofing work is being done, a foreman/supervisor with a minimum 3 years experience in the type of roofing specified or the roofing manufacturer's technical field representative.
- D. Roofing and associated work shall be performed by a single firm called the "Installer" in this Section, so that there will be undivided responsibility for the specified performance of components parts including, but not limited to, the following (even though some parts may be subcontracted to others):
 - 1. Insulation and saddles, Section 07 22 00.
 - 2. Metal flashing and counterflashing in connection with roofing, Section 07 62 00.
 - 3. Provide wood insulation stops, wood nailers, and blocking required for installation of new roof and sheet metal in conformance with requirements of Section 06 10 00.
- E. <u>Roofing membrane manufacturer shall provide a qualified technical roofing inspector on the job site</u> during installation of the fully adhered flexible sheet roofing. The technical roofing inspector shall <u>be</u> present for the pre-installation conference, a minimum of one (1) time per week during the roofing membrane and flashing installation and shall accompany the Architect during the Substantial Completion inspection for the project.
- F. Roof membrane system shall be designed to meet wind-loading requirements for State of Indiana Building Codes and Regulations. Refer to Structural Drawings for wind velocity.
- G. Protect roofing membrane during installation from shoe marks, debris, mud, loose screws and fasteners, adhesive over runs and overflows. Clean roof in its entirety following completion of roofing Work. Marked-up, scuffed-up and all of the above will not be tolerated.
- H. Patching at roof areas will NOT BE ALLOWED regardless of manufacturers warranty requirements.
- I. Cleaning of the roof membrane shall be in strict accordance with the manufacturers written instructions. Power cleaners (washers or scrubbers) will not be allowed.
- J. <u>Final payment may be withheld if final roof appearance is not satisfactory to the Architect or Owner</u>
- K. The Architect and the Owner reserve the right, at their discretion, to reject all roofing Work based on appearance of the final roof membrane installation. Excessive patching, striping and corrections will not be allowed and may be cause for rejection.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers and rolls with labels intact and legible. Materials having fire resistance classifications shall be delivered to the Project with labels attached as required. Deliver materials in sufficient quantity to allow continuity of work.
- B. Product shall be stored indoors or in properly protected areas outdoors to provide continuous protection against wetting and moisture absorption. Adhesive shall be stored in temperature above 40 degrees F.
 - 1. Materials stored outdoors shall be on raised platforms and cover top and sides with waterproofed materials properly tied down. Remove wet products from project site.
 - 2. Handle roll goods as to prevent damage to edge or ends.
 - 3. Provide continuous protection of products during delivery, storage, handling, and application.
 - 4. Do not store roofing materials in concentrated areas of roof deck.

1.5 MEMBRANE STORAGE DURING CONSTRUCTION

A. Store rolls on pallets fully protected from the weather with clean canvas tarpaulins. Un-vented plastic or polyethylene tarpaulins are unacceptable due to accumulation of moisture.

1.6 JOB CONDITIONS

A. <u>Pre-Roofing Conference</u>

- 1. Before installation of roofing and associated work, meet at Project site with installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of other work in and around roofing that must follow the roofing work (including Mechanical Work, if any), the Architect and other representatives directly concerned with performance of the work, including (where applicable) insurers, test agencies, product manufacturers, governing authorities, and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements (or disagreements) reached and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to roofing work, including, but not necessarily limited to, the following:
 - a. Review project requirements (Drawings, Specifications and other Contract Documents).
 - b. Review required submittals, both completed and yet to be completed.
 - c. Review status of substrate work (not by the roofing installer), including drying, structural loading limitations, and similar considerations.
 - d. Review availability of materials, tradesmen, equipment, and facilities needed to make progress and avoid delays.
 - e. Review required inspection, testing, certifying, and accounting procedures.
 - f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including the possibility of temporary roofing.
 - g. Review regulations concerning code compliance, environmental protection, health, safety, fire, and similar considerations.
 - h. Review procedures needed for protection of roofing during the remainder of the construction period.
 - i. Consider each party's extant judgment, as advanced in the interest of successful completion of the work.
- 2. **Roofing work may not begin until after the pre-roofing conference.** Meeting minutes of the pre-roofing conference shall be reviewed and commented by all involved parties prior to the application of the roofing work.
- 3. **PRE-ROOFING CONFERENCE IS MANDATORY** for the:
 - a. Roofing membrane manufacturer's technical inspector for the project.
 - b. Roofing membrane representative for the membrane manufacturer.
 - c. Design/Builder (D/B representative)
 - d. Architect or Architect's representative.
 - e. Roof and deck insulation manufacturer's representative.
 - f. Flashing and sheet metal contractor.
 - g. Mechanical contractor for coordination of roof top curbs and air handler unit penetrations.
- B. Weather Condition Limitations
 - 1. Proceed with roofing and associated work only when weather conditions will permit unrestricted use of materials and quality control of the Work being installed, complying with the requirements and with the recommendations of the roofing materials manufacturer.
 - a. Proceed only when the Installer is willing to guarantee the work as required and without additional reservations and restrictions.

FULLY ADHERED PVC SHEET ROOFING

2. Apply in dry weather on a dry deck only. Where rain or inclement weather occur during application, the Work shall stop and not resume until the weather has cleared and the deck is properly dry.

1.7 ROOF MAINTENANCE MANUAL

- A. Roofing membrane manufacturer shall submit a Roof Maintenance and Inspection Manual with warranties and project closeout submittals. (Final payment will not be made until roof maintenance manual is submitted).
- B. Roof Maintenance and Inspection Manual shall be bound in a single, combined PDF, bookmarked and titled accordingly with name of project, Owner, Architect, and Roofing Contractor on front cover.
- C. Roof Maintenance and Inspection Manual shall include:
 - 1. Cover letter recommending to the Owner that 2 roof maintenance inspections should be conducted per year.
 - 2. Table of Contents.
 - 3. Visual inspection checklist indicating specific flashings and details to be inspected. Include items such as base flashing seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, skylight flashings, etc. Applicable items shall be listed per project.
 - 4. Copies of as-built roofing details.
 - 5. Roof plan indicating penetrations, detail locations, roof drains, and seams.
 - 6. Roof Maintenance and Inspection Manual shall be submitted in PDF format combined and bookmarked in one (1) PDF.

1.8 WARRANTIES

- A. The <u>Contractor shall furnish to the Owner a written guarantee</u> warranting the roofing insulation and flashing work, including the installation of products furnished by others and installed under this Section of the Work, against defects in materials and workmanship <u>for a period of 5 years</u> from the Date of Substantial Completion.
 - 1. Guarantee shall include, but not be limited to, roofing, roof insulation, sheet metal flashings and gravel stops, gutters and downspouts, flexible flashings, expansion joints, control joints, and curbs at roof openings.
 - 2. Guarantee period shall begin on the date of Substantial Completion for the Project or such date that the roof is accepted by the Architect and Owner, if the date is after the date of Substantial Completion.
 - 3. Repairs required, either permanent or temporary, to roofing or roof flashings under this guarantee to keep the roof watertight shall be made within 3 days after notice of the need for repairs. Should the Contractor fail to make such repairs within the time period, the Owner may have such repairs made and charge the cost to the Contractor.
- B. In addition to the guarantee above, provide to the Owner a written warranty from the roofing membrane manufacturer, warranting the roofing system membrane, flashing, and all roof system items against leaks and defects in materials and workmanship for a period of 20 years no dollar limit, starting the day of Substantial Completion as established by the Architect.
 - 1. Warranties shall be extended as required to cover the time period between roof membrane completion and the Date of Substantial Completion for the building or portion thereof.

PART 2 - PRODUCTS

2.1 FULLY ADHERED PVC ROOFING SYSTEM

- A. Acceptable Manufacturers;
 - 1. "Duro-Last X 60-Mil Membrane" by Duro-Last, Saginaw, MI (WCSC Design Standard)

2.2 MATERIALS

- A. Membrane:
 - 1. Type: fully adhered in cold adhesive.
 - 2. Thickness: Nominal <u>.060 inch thick reinforced membrane</u>. (60 MIL)
 - 3. Breaking Strength (ASTM D751): 110 pounds min.
 - 4. Underwriters Laboratory: Roof system shall be a U.L Class "A" roof.
 - 5. Low Temperature Bend (ASTM D2136): -40 degrees F. PASS
 - 6. Weight Change After Immersion (ASTM D570): 1.7% maximum.
 - 7. Seam Strength (ASTM D751): PASS
 - 8. Accelerated Weathering Test (ASTM G154): 10,000 hours- no cracking, no crazing and negligible discoloration
 - 9. UL: Class A.
 - 10. Factory Mutual: Class 1-90
 - 11. Color: light gray white.
- B. Flashing Material:
 - 1. All flashing material shall be flashing membrane as recommended in roofing manufacturer's standard details.
 - 2. Pressure sensitive flashing is not allowed.
- C. All seaming shall be hot-air welding tool.
- D. Cold adhesive as recommended and applied in rates and method as recommended by the manufacturer.
- E. Membrane reinforcement shall be fiberglass or polyester scrim
- F. Membrane shall be U.L, Class A rated.
- G. Roofing membrane and applications as specified shall comply with all requirements of FM 1-90. Submit approvals and certifications as specified herein.
- H. At all parapets, run the roofing membrane up and over the top of the parapet, and down 2" on the outside face of the parapet.

PART 3 - EXECUTION

3.1 SUBSTRATE AND SURFACE PREPARATION

A. Roofing contractor shall verify proper surfaces to receive roofing and flashing materials. Do not apply roofing membrane during periods of precipitation. <u>Do not apply below 40 degrees F.</u>

- B. ALL substrates, metal decking and insulation layers shall be free from debris, trash, dirt, screws, cans, and all other contaminants.
- C. Coordinate installation of all items by other trades prior to starting roofing Work.

3.2 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
 - 1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
 - 2. Prevent materials from entering and clogging roof drains and conductors, and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecasted.
 - 3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing at end of workday or when rain is forecasted. Remove and discard temporary seals before beginning work on adjoining roofing area.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials immediately upon delivery and again before installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Recheck measurements and dimensions, before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

3.3 MEMBRANE INSTALLATION

- A. Follow membrane manufacturers recommended application procedures for the application of the membrane roofing. Install in strict accordance with the manufacturers written installation instructions.
- B. Provide all items and accessories as required for a complete and watertight installation in every respect.
- C. Ensure membrane is flat, smooth and taught prior to application of adhesive. Wrinkles in membrane will not be allowed or accepted.

3.4 FLASHING INSTALLATION

- A. Cover all vertical surfaces with membrane as recommended by the manufacturer.
- B. Weld and adhere flashings to roofing membrane as recommended by the manufacturer.
- C. Install walkways pads where indicated on the Drawings in accordance with the manufacturers written installation instructions.

- D. General:
 - 1. All penetrations shall be sealed.
 - 2. At roof drains, end membrane 1" inside drain clamping ring.
 - 3. Drain Protection: Roof drains <u>shall be covered at all times</u> while work is in progress and opened for water flow at time when work is not in progress and the roof membrane surface is clean free of dirt, waste and debris. THIS WILL BE ENFORCED.
- E. All soil stacks and roof vents penetrating the roof shall receive premolded pipe flashings with stainless steel clamp.

3.5 PROTECTION AND CLEANING OF ROOFING

- A. Upon completion of roofing, institute appropriate procedures for protection of roofing during remainder of construction period.
- B. Protect roofing membrane during installation from shoe marks, debris, mud, loose screws and fasteners, adhesive over runs and overflows. Clean roof in its entirety following completion of roofing Work. <u>Marked-up, scuffed-up and all of the above will not be tolerated.</u>
- C. Patching at roof areas WILL NOT BE ALLOWED.
- D. Cleaning of the roof membrane shall be in strict accordance with the manufacturers written instructions. Power cleaners will not be allowed.
- E. <u>Final payment may be withheld if final roof appearance is not satisfactory to the Architect or Owner.</u>
- F. The Architect and the Owner reserve the right, at their discretion, to reject all roofing Work based on appearance of the final roof membrane installation. Excessive patching, striping and corrections will not be allowed and may be cause for rejection.

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SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes heavy commercial-grade aluminum window units of the performance class indicated. Window types required include:
 - 1. Fixed and Project-Out Windows
- B. All windows shall be factory glazed.

1.2 REFERENCES

- A. AAMA American Architectural Manufacturers Association
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440-08 "NAFS North American Fenestration Standard/Specification for windows, doors, and skylights"
 - 2. AAMA 502-12 "Voluntary Specification for Field Testing of Newly Installed Fenestration Products"
 - 3. AAMA 611-12 "Voluntary Specification for Anodized Architectural Aluminum"
 - 4. AAMA 701/702-11 "Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals"
 - 5. AAMA 904-09 "Voluntary Specification for Multi-bar Hinges in Window Applications"
 - 6. AAMA 910-10 "Voluntary 'Life Cycle' Specifications and Test Methods for AW Class Architectural Windows and Doors"
 - 7. AAMA 1503-09 "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections"
 - 8. AAMA 2605-13 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels"
 - 9. AAMA CW-10-12 "Care and Handling of Architectural Aluminum from Shop to Site"
- B. ASTM International American Society for Testing and Materials
 - 1. ASTM E283-12 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"
 - 2. ASTM E330-14 "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference"
 - 3. ASTM E331-09 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference"
 - 4. ASTM E547-09 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential"
 - 5. ASTM E2190-10 "Standard Specification for Insulating Glass Unit Performance and Evaluation"
 - 6. ASTM F588-07 "Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact"
- C. IGCC Insulating Glass Certification Council
- D. NFRC National Fenestration Rating Council
 - 1. NFRC 100-2010 "Procedure for Determining Fenestration Product U Factors"

- 2. NFRC 102-2010 "Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems"
- E. SGCC Safety Glazing Certification Council
 - 1. ANSI Z97.1-09 "American National Standard for Safety Glazing Materials used in Buildings Safety Performance Specifications and Methods of Test"
 - 16 CFR 1201 "Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials – codified at Title 16, Part 1201 of the Code of Federal Regulations 2011 Edition"

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum window units complying with performance requirements specified, as demonstrated by testing manufacturer's corresponding stock systems according to test methods indicated.
- B. Design Requirements: Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA AP-AW100 for type, grade, and performance class of window units required.
- C. Window systems shall be designed to meet wind-loading requirements of the **Indiana State Building Code, latest edition** Refer to Structural Drawings for wind velocity.
- D. Testing: Test each type and size of required window unit through a recognized independent testing laboratory or agency, in accordance with ASTM E 330 for structural performance, with ASTM E 283 for air infiltration, and with both ASTM E 331 and ASTM E 547 for water penetration. Provide certified test results, complying with the provisions of the latest editions of the referenced standards.
 - 1. Structural Performance: Provide window units with no failure or permanent deflection in excess of 0.4 percent of any member's span after removal of the imposed load, for a positive (inward) and negative (outward) test pressure of 75 lbf/sq. ft.
 - 2. Air Infiltration: Provide units with air infiltration rate of not more than 0.06 cfm/ft. of operable sash joint for an inward test pressure of 6.24 lbf/sq. ft.
 - 3. Water Penetration: Provide units with no water penetration as defined in the test method at an inward test pressure of 15 percent of the design pressure.
 - 4. Condensation Resistance: Provide units that have been tested for thermal performance in accordance with AAMA 1503.1, latest edition, showing a condensation resistance factor (CRF) of not less than 50.
 - 5. Thermal Transmittance: Provide window units that have a U-value maximum of 0.69 BTU/hour/sq. ft./deg F at 15-mph exterior wind velocity, when tested in accordance with AAMA 1503.1, latest edition.

1.4 SUBMITTALS

- A. Submit the following in accordance with Division 1 requirements.
 - 1. Submit copies of product data for each type of window required, including:
 - a. Construction details and fabrication methods.
 - b. Profiles and dimensions of individual components.
 - c. Data on hardware, accessories, and finishes.

- d. Recommendations for maintenance and cleaning of exterior surfaces.
- 2. Shop drawings for each type of window required. Include information not fully detailed in manufacturer's standard product data and the following:
 - a. Layout and installation details, including anchors.
 - b. Elevations of continuous work at 1/4-inch scale and typical window unit elevations at 3/4-inch scale.
 - c. Full-size section details of typical composite members, including reinforcement.
 - d. Hardware including operators.
 - e. Glazing details.
 - f. Accessories.
 - i. Sample of Approved Product Label and location of attachment to assembly.
- B. Submit warranty as specified herein.
- C. <u>Submit proof of compliance with AAMA AP-AW100 requirements.</u> Testing for this requirement shall be by an independent testing laboratory conducted within 5 years from the date of the submittal. Test must be for a window or windows larger than those required for this project. Non-current tests and inappropriate sizes will be cause for rejection.
- D. Pre-Installation Conference notes.

1.24 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- B. Standards: Requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA 101 and applicable general recommendations published by AAMA.
- C. Single-Source Responsibility: Provide aluminum window units from one source and produced by a single manufacturer.
- E. Pre-Installation Conference: Conduct a pre-installation conference at the project site prior to ordering and installation of the aluminum windows. Coordinate shop drawings, details, and delivery dates with all contractors.

1.35 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
 - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of window units.

1.46 WARRANTY

A. Aluminum Window Warranty: Written warranty, executed by the window manufacturer, agreeing to repair or replace window units that fail in materials or workmanship within the specified warranty period. Failures include but are not necessarily limited to:

- 1. Structural failures including excessive deflection, excessive leakage, or air infiltration.
- 2. Faulty operation of sash and hardware.
- 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: 5 years from the Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers
 - 1. "Model G201 Project-Out Thermal Aluminum Window" as manufactured by Peerless Products, Inc., Ft. Scott, KS
 - 2. "Series 325X PX32 Project-Out Window" as manufactured by EFCO, LLC, Monett, MO
- A. Other manufacturers may be acceptable. However, final decision as to acceptance is solely the Architect's and will be listed in a future addendum. Submit requests for product substitution at least ten (10) days prior to bid due date.
 - 1. Specified depths of continuous receivers/receptors and total window system depth including receiver/receptor are minimums. Provide window system with all specified accessories including thermally broken, extruded aluminum, continuous head/jamb/sill receptors; extended strap anchors; and matching extruded aluminum interior box trim; all around the full perimeter of each window opening; as well as matching extruded aluminum subsill extension at the exterior of the sill.
 - 2. All additional approved manufacturers shall provide Giesse OS operator, or equal, and specified screens at each operable portion, and other specified materials and accessories.

2.2 SYSTEM DESCRIPTION

- A. AAMA Certification: AP-AW100.
- B. Configuration: project-out vent; vent-under-fixed with a horizontal integral mullion in one master frame; vent hinged at the top and projects out from the top to open.
- C. Windows: 3-1/4" frame depth; extruded aluminum with integral structural thermal break installed by the window manufacturer in the frame and vent members; equal-leg flange frame; exterior and interior finishes applied by the window manufacturer; frames and vents assembled by the window manufacturer.

2.3 MATERIALS

- A. Aluminum extrusions: extruded by the window manufacturer from commercial quality 6063-T5 alloy; free from defects impairing strength and durability.
- B. Frame: Double tubular head, sill, and jambs miter cut and fastened with two zamac corner gussets per corner; double tubular integral mullion, if required, fastened with two zamac gussets per frame member without penetrating the frame member with fasteners; corners sealed by the window manufacturer with sealant conforming to AAMA 800-10.
- C. Vents: Double tubular horizontal and vertical vent rails and stiles miter cut and fastened with two zamac corner gussets per corner; corners sealed by window manufacturer with sealant conforming

to AAMA 800-10.

- D. Water Control: Continuous compression gasket to utilize pressure equalization and to allow water to drain by gravity.
- E. Window Frame: Extruded aluminum with integral structural thermal break installed by the window manufacturer in the frame and vent members; exterior and interior finishes applied by the window manufacturer; frames and vents assembled by the window manufacturer.
 - 1. Frame Depth: 3-1/4 inches (83 mm).
 - 2. Fabricated with equal-leg flange frame.
 - F. Thermal break: The thermal break separating the exterior and interior aluminum extrusions shall be a mechanical crimp-in-place system utilizing multi-directional glass fiber reinforced polyamide nylon struts with locking mechanical connections to the aluminum extrusions. The thermal break shall not be compromised by hardware or metal fasteners.
- G. Glazing: exterior ExxonMobil Santoprene[™] foam gasket; 1" insulating glass; two weep holes under each glass pocket for drainage; foam backer rod and silicone heel bead forming an internal seal; interior Santoprene[™] bulb gasket threaded into aluminum glazing beads; glass description in item G. below; glazed by the window manufacturer.
- H. Weatherstrip: secured in extruded ports; Santoprene[™] seals conforming to AAMA 702-11; flap seal single row mounted on the vent interior on the bottom rail, top rail, and stiles; triple-tubular seal single internal row mounted on the head, sill and jamb frame members.
- I. Operating hardware: mounted in concealed extruded grooves to avoid penetrating frame or vent members with fasteners:
 - 1. two concealed stainless steel hinges conforming to AAMA 904-09 per vent to rotate the vent on horizontal axis.
 - 2. One single-action OS (out-swing) operator handle with multiple point locks per vent, painted to match the finish of the window
 - 3. Provide with key-release limit arms with clear opening dimension of 8".
- J. Receivers, Trim and Mullions:
 - Provide all windows with minimum 7.702" deep, thermally-broken receiver at window jambs and head, and minimum 7.702" wide, thermally-broken subsill at window sill (refer to manufacturer's receptor detail "G2DIRS with Strap Anchors/Sill Extender"). Receivers and subsill shall be fully continuous around the perimeter of the window opening. Receivers and subsill shall span the wall cavity and be fastened to the supporting construction to meet applicable load requirements. Provide matching two- piece snap-in box trim at all receivers and subsills to fill gap between receivers, subsills and window frame.
 - 2. Provide all windows with extruded aluminum sill angle extension on the exterior, to span from subsill to masonry/precast sill.
 - 3. Window units shall be provided with integral horizontal mullions between units.
 - 4. Provide vertical three-piece mullion with polyamide strip thermal break to properly join multiple window units together within the same opening and meet design pressure requirements. Fasteners shall be concealed.
 - 5. Materials: extruded aluminum; nominal .062" wall; with exposed surfaces finished to match window color and finish performance;
 - 6. Provide trim with concealed fasteners, required weatherseals, polyamide thermal breaks when spanning cavity, and design for unrestricted expansion and contraction.
- K. Glass with Internal Blinds

- 1. All aluminum windows shall be dual glazed. All aluminum windows shall have internal, integral, between-the-glass blinds.
 - a. The exterior glass shall be an insulated glass unit (1" thick) and certified as manufactured by Peerless Products, Inc. consisting of 1/4" clear tempered exterior with Cardinal Glass LoE-270 on #2 face, 1/2" airspace, and 1/4" clear tempered interior. Guardian Industries Sunguard Supernuetral 68 or PPG Solarban 60 on the #2 face is also acceptable.
 - b. Head and sill rails of blinds shall be extruded aluminum. Blind slats to be (5/8"or 1") aluminum.
 - c. Blinds: 1" x .008" aluminum slats; slat color chosen from manufacturer's standards; tilt adjusted with interior tilt control knob.
 - d. Interior glass shall be 1/4" clear tempered removable panel, custodial fastened.
- 2. Glass surface protection: Factory-apply removeable protective clear Cardinal Glass Preserve[™] film on insulating glass exterior and interior surfaces for protection during window installation and building construction.
- L. Insect screens: full; mounted on the window frame interior; 3/8" x 1-3/8" x .050" extruded tubular aluminum frame with the same finish as the window interior in color and performance; corners mitered, gusset reinforced, and crimped; 18 x 16 dark aluminum mesh; flexible PVC spline. Screen mounting holes shall be factory drilled.

2.23 HARDWARE

- A. Projected units: White bronze cam handle, stainless steel concealed friction hinges or surface mounted extruded aluminum butt hinges.
- B. Concealed stainless steel hinges on all operating units shall conform to AAMA 904.1. Provide cam-lock manual push-out for project units, manufacturer's standard.

2.34 ACCESSORIES

- A. Provide the manufacturer's standard accessories that comply with specified requirements.
- B. Provide all receptors, sill flashing (.062"), and head flashings at all windows as required to provide a watertight installation.
- C. Provide weatherstripping at all operable units. All weatherstripping shall be EPDM or neoprene bulbs.
- D. Insect Screen: Provide insect screens for each operable exterior sash or ventilator. Locate screens on the inside of the window sash or ventilator, depending upon window type. Design windows and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches.
 - 1. Screen Frames: Fabricate frames of tubular-shaped extruded or formed aluminum members of 0.040-inch minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units.
 - 2. Provide removable PVC spline-anchor concealing the edge of the screen frame.

2.5 FABRICATION

- A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
- B. Pre-Glazed Fabrication: Comply with glass and glazing requirements of Section 08 80 00 Glazing, AAMA 101 and wind loading requirements.
- C. Mullions: Integral mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, in the manner indicated.
- D. Frame shall be mechanically joined and reinforced at all corners. All corners shall be mitered.
- E. Operable vents shall be tubular members with mitered corners, gusset reinforced and crimped.
- F. All frame and vent joints shall be factory sealed with sealant conforming to AAMA 800.
- G. Water Control: compression gaskets on vent interior shall utilize pressure equalization and shall allow water to drain by gravity.
- H. Drip caps shall be field mounted on frame exteriors above all vent heads. Finish shall match window finish.

2.6 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. AAMA 608 dark bronze anodized finish conforming to AAM10C22A44 Class I, .7 mils thick.
- D. Powder coat finishes complying with AAMA 2604 and AAMA 2605 are acceptable. Color as selected by Architect.
- E. 70% PVDF resin-based coat finishes complying with AAMA 2605 are acceptable. Color as selected by Architect.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
 - 1. Verify cleaning of masonry is complete prior to installation of aluminum windows.
- B. Verify that rough or masonry opening is correct and the sill plate is level.

3.2 INSTALLATION

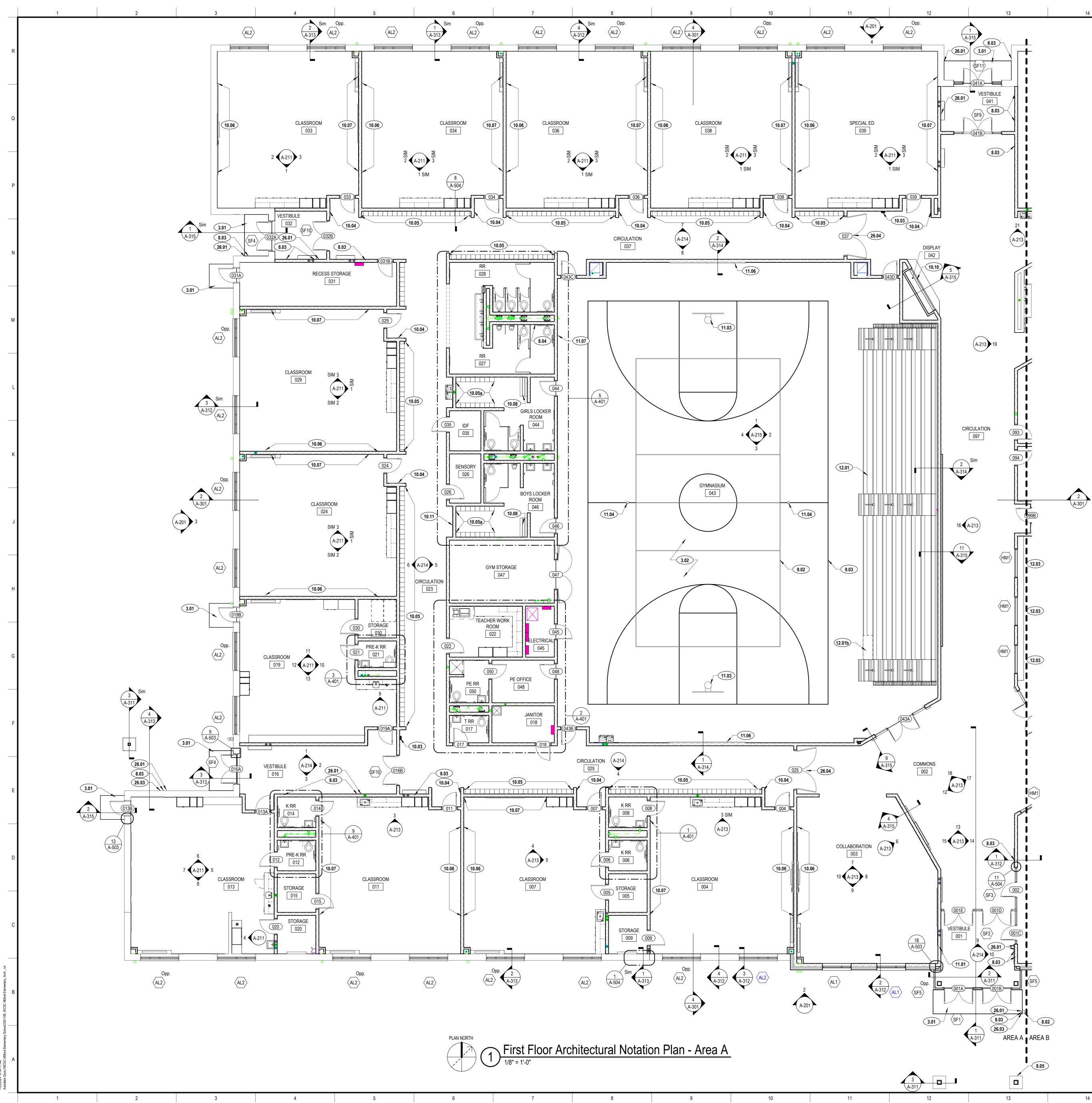
#2301106 ©ELEVATUS Architecture ALUMINUM WINDOWS

- A. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division 7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
 - 1. Compounds, joint fillers, and gaskets to be installed after installation of window units are specified as work in another section in Division 7.
- B. Provide all items as required for a complete and watertight installation in every respect, whether or not indicated on the drawings or specifications. Provide all miscellaneous accessories and trim and panning flashing as required whether or not indicated on the drawings or specified herein.
- C. All installed windows shall be weather and watertight in every respect.
- D. Erection Tolerance: Maximum variation from plumb is 1/16-inch in 3'-0 non-cumulative or 1/8-inch in 10'-0, which ever is less.

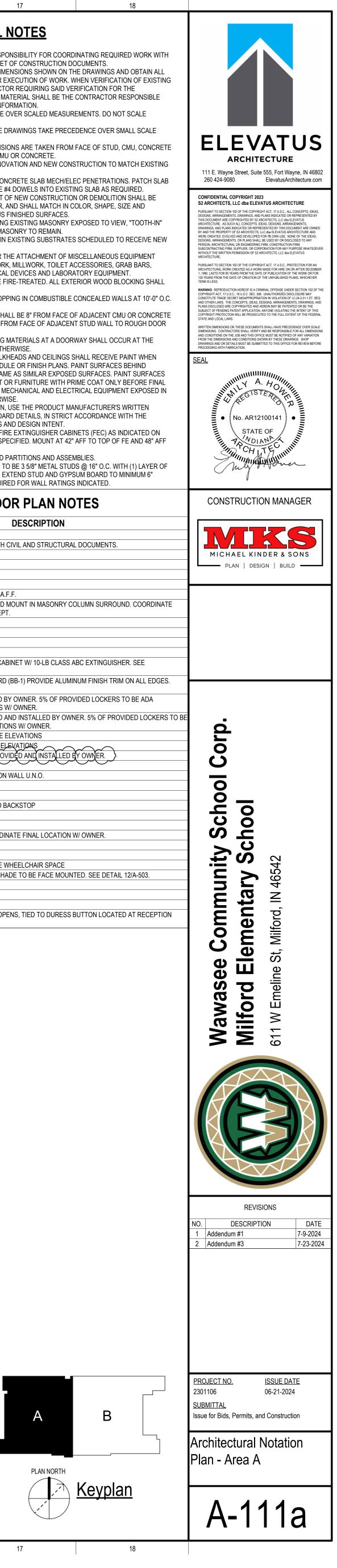
3.3 ADJUSTING, CLEANING, AND PROTECTION

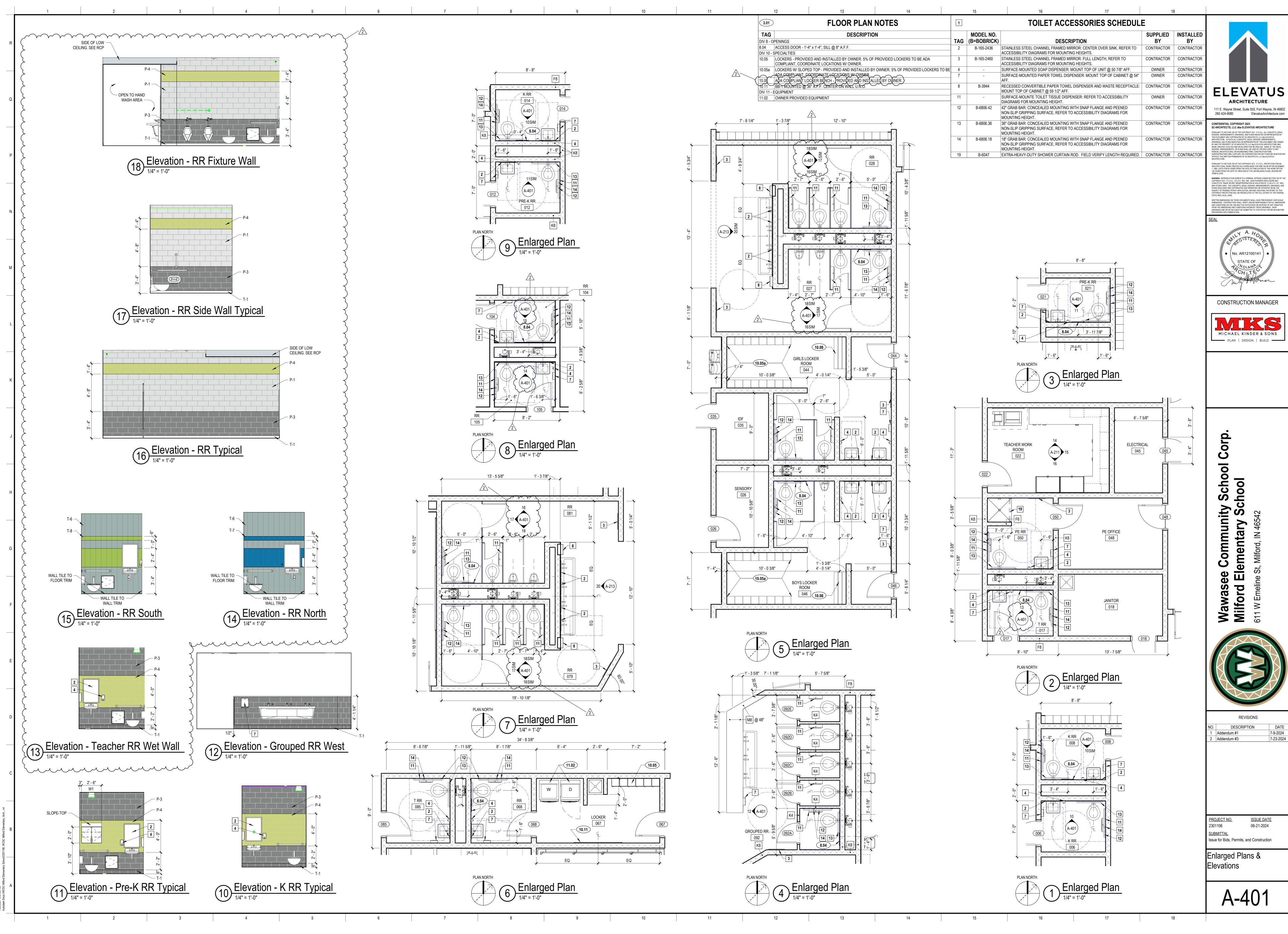
- A. Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.
- B. Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- C. Clean glass of pre-glazed units promptly after installation of windows. Comply with requirements of the "Glass and Glazing" section for cleaning and maintenance.
- D. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION



<u>FLC</u>	OR PLAN GENERAL NOTES
4 05	
	NERAL CONTRACTOR SHALL TAKE RESPONSIBILITY FOR COORDINATING REQUIRED V L TRADES BASED UPON A COMPLETE SET OF CONSTRUCTION DOCUMENTS.
	CH CONTRACTOR SHALL VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AND OF
	ASUREMENTS REQUIRED FOR PROPER EXECUTION OF WORK. WHEN VERIFICATION OF
	MENSIONS IS REQUIRED, THE CONTRACTOR REQUIRING SAID VERIFICATION FOR THE
	INSTRUCTION OR FABRICATION OF HIS MATERIAL SHALL BE THE CONTRACTOR RESPO IR THE PROCUREMENT OF THE FIELD INFORMATION.
	RITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED MEASUREMENTS. DO NOT SC/
	AWINGS.
	TAILED DRAWINGS AND LARGER SCALE DRAWINGS TAKE PRECEDENCE OVER SMALL
	AWINGS.
	ILESS NOTED OTHERWISE, PLAN DIMENSIONS ARE TAKEN FROM FACE OF STUD, CMU, R EXISTING FINISH TO FACE OF STUD, CMU OR CONCRETE.
	PAIR ALL SURFACES DAMAGED BY RENOVATION AND NEW CONSTRUCTION TO MATCH
AD	JACENT OR CONTIGUOUS FINISH.
	NERAL CONTRACTOR TO PATCH ALL CONCRETE SLAB MECH/ELEC PENETRATIONS. PA
	USH WITH EXISTING SLAB AND PROVIDE #4 DOWELS INTO EXISTING SLAB AS REQUIRE
	L CUTTING AND PATCHING AS A RESULT OF NEW CONSTRUCTION OR DEMOLITION SH. RFORMED IN A WORKMANLIKE MANNER, AND SHALL MATCH IN COLOR, SHAPE, SIZE A
	XTURE ADJACENT AND/OR CONTIGUOUS FINISHED SURFACES.
	HERE PATCHING, REPAIRING OR INFILLING EXISTING MASONRY EXPOSED TO VIEW, "TO
	W MASONRY TO ADJACENT EXISTING MASONRY TO REMAIN.
	TCH ALL CRACKS AND RESEAL JOINTS IN EXISTING SUBSTRATES SCHEDULED TO REC
	NSHES. OVIDE ALL BLOCKING NECESSARY FOR THE ATTACHMENT OF MISCELLANEOUS EQUIF
	CUDING BUT NOT LIMITED TO CASEWORK, MILLWORK, TOILET ACCESSORIES, GRAB E
	NDRAILS, DOOR HARDWARE, ELECTRICAL DEVICES AND LABORATORY EQUIPMENT.
	L INTERIOR WOOD BLOCKING SHALL BE FIRE-TREATED. ALL EXTERIOR WOOD BLOCKI
BE	PRESSURE TREATED.
	OVIDE FIRE-BLOCKING AND DRAFT-STOPPING IN COMBUSTIBLE CONCEALED WALLS A
	IX. HORIZONTALLY & VERTICALLY.
	ORS NOT OTHERWISE DIMENSIONED SHALL BE 8" FROM FACE OF ADJACENT CMU OR ALL TO ROUGH DOOR OPENING, AND 4" FROM FACE OF ADJACENT STUD WALL TO ROL
	ENING.
•	E TRANSITION OF DIFFERENT FLOORING MATERIALS AT A DOORWAY SHALL OCCUR A
CE	NTERLINE OF DOOR UNLESS NOTED OTHERWISE.
	L WALL SURFACES, DOOR FRAMES, BULKHEADS AND CEILINGS SHALL RECEIVE PAINT
	INT IS INDICATED ON THE FINISH SCHEDULE OR FINISH PLANS. PAINT SURFACES BEH
	VABLE EQUIPMENT AND FURNITURE SAME AS SIMILAR EXPOSED SURFACES. PAINT S
	HIND PERMANENTLY FIXED EQUIPMENT OR FURNITURE WITH PRIME COAT ONLY BEFOR STALLATION OF EQUIPMENT. PAINT ALL MECHANICAL AND ELECTRICAL EQUIPMENT EXP
	VISHED SPACES UNLESS NOTED OTHERWISE.
	R CONSTRUCTION DETAILS NOT SHOWN, USE THE PRODUCT MANUFACTURER'S WRIT
INS	STALLATION INSTRUCTIONS AND STANDARD DETAILS, IN STRICT ACCORDANCE WITH T
PR	OJECT SPECIFICATION REQUIREMENTS AND DESIGN INTENT.
	OVIDE FIRE EXTINGUISHERS (FE) AND FIRE EXTINGUISHER CABINETS (FEC) AS INDICA
T 11	E PLANS. PROVIDE TYPE AND SIZE AS SPECIFIED. MOUNT AT 42" AFF TO TOP OF FE AM
TC	TOP OF FEC.
TC 19. RE	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES.
TC 19. RE 20. UN	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1)
TC 19. RE 20. UN 5/8	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES.
TC 19. RE 20. UN 5/8	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) " TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED.
TC 19. RE 20. UN 5/8 AB	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES
19. RE 20. UN 5/8 AB 3.01 TAG	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) " TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION
TC 19. RE 20. UN 5/8 AE 3.01 TAG DIV 3 - C	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE
19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01	TOP OF FEC. IFER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS.
19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.02 DIV 8 - C	TOP OF FEC. IFER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS.
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.02 DIV 8 - C	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED.
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.02	TOP OF FEC. IFER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL PENINGS EXTERIOR POST
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.02 8.03	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED.
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.03 8.04	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL OPENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F.
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.03 8.04 8.05	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION CONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL PPENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F. EMERGENCY KEY CABINET. RECESSED MOUNT IN MASONRY COLUMN SURROUND. C
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.02 8.03 8.04 8.05	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) " TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED.
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TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.03 8.04 8.05 DIV 9 - F 9.02 9.03	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED.
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TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.03 8.03 8.04 8.05 DIV 9 - F 9.02 9.03 DIV 10 - 10.03	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION ONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL OPENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F. EMERGENCY KEY CABINET. RECESSED MOUNT IN MASONRY COLUMN SURROUND. C FINAL LOCATION WITH LOCAL FIRE DEPT. INISHES PAINTED VOLLEYBALL COURT LINES PAINTED VOLLEYBALL COURT LINES SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIFICATION.
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TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.02 8.03 8.04 8.05 DIV 9 - F 9.02 9.03 DIV 10 - 10.03 10.04 10.05	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. ILESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION ONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL OPENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F. EMERGENCY KEY CABINET. RECESSED MOUNT IN MASONRY COLUMN SURROUND. C FINAL LOCATION WITH LOCAL FIRE DEPT. INISHES PAINTED VOLLEYBALL COURT LINES SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIALTIES
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.02 8.03 8.04 8.05 DIV 9 - F 9.02 9.03 DIV 10 - 10.03 10.04 10.05	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. LESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16" O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION ONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL PPENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F. EMERGENCY KEY CABINET. RECESSED MOUNT IN MASONRY COLUMN SURROUND. C FINAL LOCATION WITH LOCAL FIRE DEPT. INISHES PAINTED VOLLEYBALL COURT LINES PAINTED VOLLEYBALL COURT LINES SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIFICATION. PROVIDE A 4'W x 6'4"H BULLETIN BOARD (BB-1) PROVIDE ALUMINUM FINISH TRIM ON J INISTALL 8" A.F.F. LOCKERS W, SLOPED TOP - PROVIDED AND INSTALLED BY OWNER. 5% OF PROVIDED LOCKERS TO BI COMPLIANT, COORDINATE LOCATIONS W/ OWNER.
TC 19. RE 20. UN 5/8 AB 3.01 TAG DIV 3 - C 3.01 3.02 DIV 8 - C 8.03 8.04 8.03 8.04 8.05 DIV 9 - F 9.02 9.03 DIV 10 - 10.03 10.05 10.05a	TOP OF FEC. FER TO LIFE SAFETY PLANS FOR RATED PARTITIONS AND ASSEMBLIES. LESS NOTED OTHERWISE, NEW WALLS TO BE 3 5/8" METAL STUDS @ 16° O.C. WITH (1) "TYPE "X" GYPSUM BOARD EACH SIDE. EXTEND STUD AND GYPSUM BOARD TO MINIM OVE FINISHED CEILING. SEAL AS REQUIRED FOR WALL RATINGS INDICATED. FLOOR PLAN NOTES DESCRIPTION ONCRETE CONCRETE STOOP. COORDINATE WITH CIVIL AND STRUCTURAL DOCUMENTS. RECESSED SLAB. SEE STRUCTURAL PENINGS EXTERIOR POST ADA ACTUATOR - SEE ELECTRICAL ACCESS DOOR - 1'-4" x 1'-4", SILL @ 8" A.F.F. EMERGENCY KEY CABINET. RECESSED MOUNT IN MASONRY COLUMN SURROUND. C FINAL LOCATION WITH LOCAL FIRE DEPT. INISHES PAINTED VOLLEYBALL COURT LINES SPECIALTIES SEMI-RECESSED FIRE EXTINGISHER CABINET W/ 10-LB CLASS ABC EXTINGUISHER. S SPECIFICATION. PROVIDE A 4'W x 6'4"H BULLETIN BOARD (BB-1) PROVIDE ALUMINUM FINISH TRIM ON J INISTALL 8" A.F.F. LOCKERS - PROVIDED AND INSTALLED BY OWNER. 5% OF PROVIDED LOCKERS TO BI COMPLIANT, COORDINATE LOCATIONS W/ OWNER.
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Addendum #3 Issue Date: July 23, 2024 Milford Elementary School

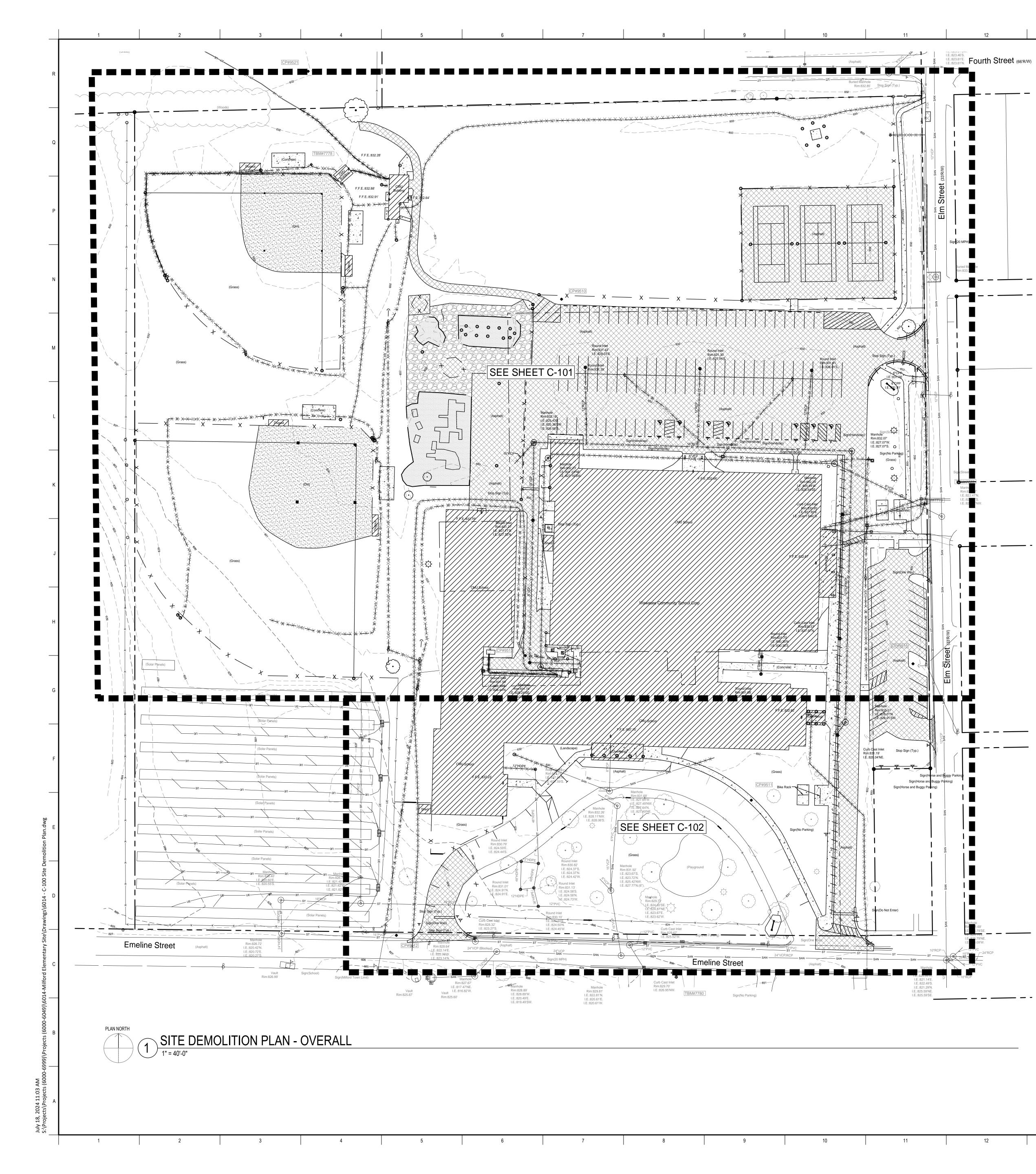
This is issued as a supplement to the plans and specifications and shall be considered an integral part of the same.

Item 1:C-100, C-101, C102Description:Clarification

A. "X" linetype for "REMOVE OR ABANDON UTILITY, AS REQUIRED, FOR NEW CONSTRUCTION. COORDINATE ALL WORK WITH UTILITY OWNER" has been lightened to make areas of concentrated utility removal easier to read.

Item 2:L-101Description:Clarification

A. Visual adjustment of mechanical pads and screening wall. Stone fill lessened by approximately 3.2cyd.



GENERAL NOTES:

- 1. OBTAIN ALL REQUIRED PERMITS AND COORDINATE INSPECTIONS FROM AUTHORITIES HAVING JURISDICTION.
- 2. CONTRACTOR SHALL NOT INTERRUPT ANY SERVICE TO ADJACENT PROPERTIES WITHOUT WRITTEN AUTHORIZATION FROM PROPERTY OWNER. AN EMERGENCY PLAN SHALL BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRUCTION TO OUTLINE CORRECTIVE MEASURES IN THE EVENT OF ANY UNAUTHORIZED UTILITY SHUTDOWN.
- 3. CONTRACTOR SHALL STUDY ALL DRAWINGS PRIOR TO CONSTRUCTION. RESEARCH PUBLIC UTILITY RECORDS, CONTACT THE LOCAL UTILITY LOCATOR SERVICE, AND FIELD VERIFY ALL EXISTING STRUCTURES PRIOR TO CONSTRUCTION. CONTACT ENGINEER FOR DIRECTION IF EXISTING UTILITY CONDITIONS CONFLICT WITH PROPOSED WORK, OR ANY ALTERATIONS SHALL BE THE CONTRACTORS RESPONSIBILITY.
- 4. EXISTING UTILITIES ARE APPROXIMATIONS BASED ON BEST AVAILABLE DATA. CAUTION SHALL BE EXERCISED TO NOT INTERRUPT SERVICE TO ANY BUILDING. EXPLORATORY TRENCH TO VERIFY DEPTH AND LOCATION OF SEWERS PRIOR TO CONSTRUCTION OF NEW SEWER UTILITIES. ASSURE ALL SANITARY FLOW IS DIRECTED INTO THE SANITARY SEWER ON-SITE AND ALL STORM WATER IS DIRECTED INTO THE STORM SEWER SYSTEM.
- 5. CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION REQUIRED BY UTILITY OWNERS TO CONSTRUCT PROJECT.
- 6. PROVIDE RECORD DRAWINGS TO THE OWNER FOR BELOW GRADE IMPROVEMENTS. INCLUDE: MATERIALS OF CONSTRUCTION, SIZE, ELEVATIONS, AND LOCATION DESCRIPTIONS IN THE RECORD. RECORD DRAWINGS SHALL BE CERTIFIED BY A LAND SURVEYOR REGISTERED IN THE STATE OF INDIANA.
- CONTRACTOR SHALL COORDINATE WITH EACH UTILITY PROVIDER TO DETERMINE TOTAL COST OF SERVICE TO BUILDING AND TO INCLUDE IN THE COST OF THE PROJECT.
- 8. CONTRACTOR SHALL LOCATE ALL PRIVATE UTILITIES NOT COVERED BY THE PUBLIC LOCATING SERVICE.
- 9. CONSTRUCTION DE-WATERING AS NECESSARY BY CONTRACTOR.
- ADJUST ANY EXISTING MANHOLES, VALVES, HYDRANTS, AND HANDHOLES, LOCATED WITHIN PROJECT LIMITS, TO PROPOSED GRADES.
 CONTRACTOR SHALL SUPPORT AND PROTECT ALL EXISTING UTILITIES DURING
- CONSTRUCTION OF ADJACENT WORK. 12. SEE SITE SURVEY FOR EXISTING CONDITIONS. IF ABANDONED WELLS ARE DISCOVERED ON THE PROPERTY, THEY MUST BE CAPPED BY A LICENSED WELL
- DRILL DRILLER ACCORDING TO INDIANA WELL DRILLING CODES AND REGULATIONS.
- 13. COORDINATE ALL DEMOLITION WORK WITH OWNER.

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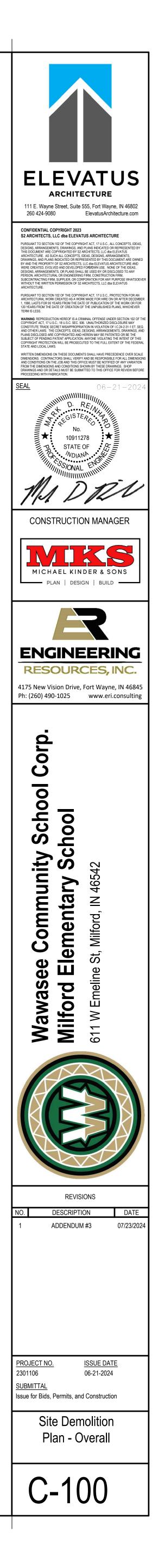
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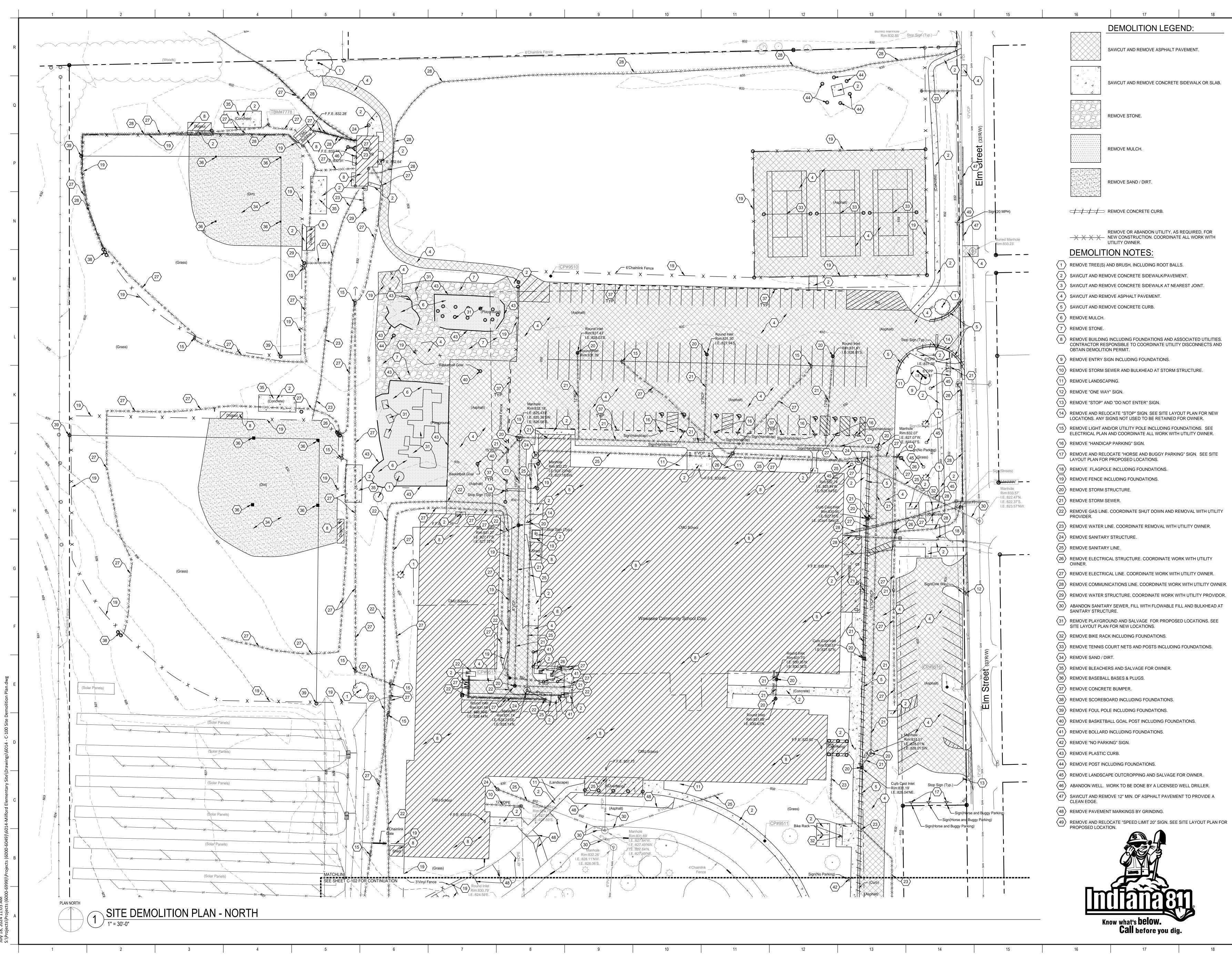
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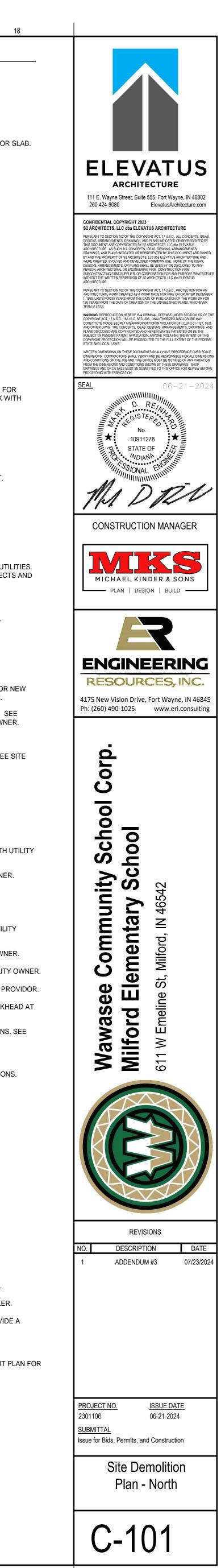
14. CONTRACTOR IS RESPONSIBLE FOR ALL PERMIT FEES, TAPPING FEES, INSPECTION FEES, ETC.



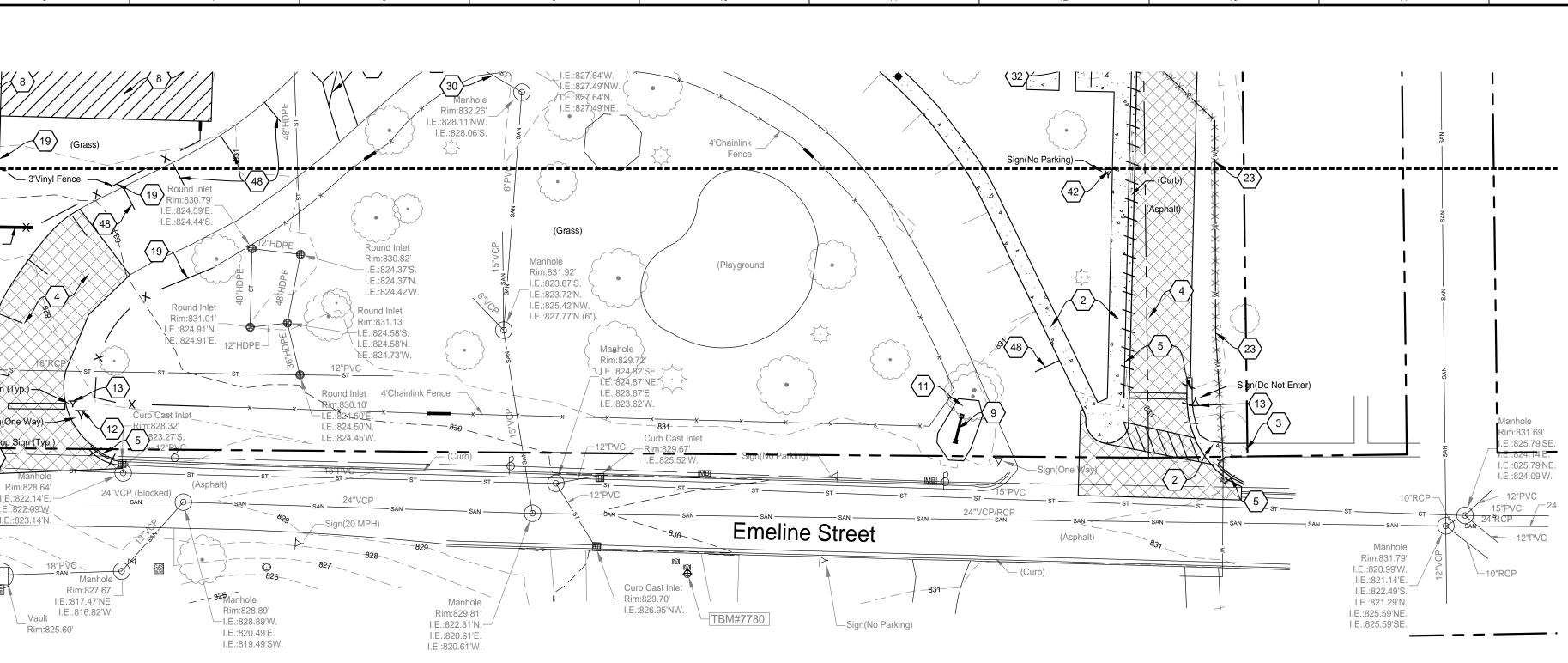








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MOLITION PLAN - SOUTH



	DEMOLITION LEGEND:
	SAWCUT AND REMOVE ASPHALT PAVEMENT.
	SAWCUT AND REMOVE CONCRETE SIDEWALK
	REMOVE STONE.
	REMOVE MULCH.
	REMOVE SAND / DIRT.
· <u> </u>	REMOVE CONCRETE CURB.

REMOVE OR ABANDON UTILITY, AS REQUIRED, FOR UTILITY OWNER.

DEMOLITION NOTES:

- $\langle 1 \rangle$ REMOVE TREE(S) AND BRUSH, INCLUDING ROOT BALLS.
- (2) SAWCUT AND REMOVE CONCRETE SIDEWALK/PAVEMENT.
- $\langle 3 \rangle$ SAWCUT AND REMOVE CONCRETE SIDEWALK AT NEAREST JOINT.
- $\langle 4 \rangle$ SAWCUT AND REMOVE ASPHALT PAVEMENT.
- $\left< 5 \right>$ SAWCUT AND REMOVE CONCRETE CURB.
- $\left< 6 \right>$ REMOVE MULCH.
- $\langle 7 \rangle$ REMOVE STONE.

(8) REMOVE BUILDING INCLUDING FOUNDATIONS AND ASSOCIATED UTILITIES. CONTRACTOR RESPONSIBLE TO COORDINATE UTILITY DISCONNECTS AND OBTAIN DEMOLITION PERMIT.

- $\langle 9 \rangle$ REMOVE ENTRY SIGN INCLUDING FOUNDATIONS.
- $\langle 10 \rangle$ REMOVE STORM SEWER AND BULKHEAD AT STORM STRUCTURE.
- (11) REMOVE LANDSCAPING.
- (12) REMOVE "ONE WAY" SIGN.
- (13) REMOVE "STOP" AND "DO NOT ENTER" SIGN.
- (14) REMOVE AND RELOCATE "STOP" SIGN. SEE SITE LAYOUT PLAN FOR NEW LOCATIONS. ANY SIGNS NOT USED TO BE RETAINED FOR OWNER.
- 15 REMOVE LIGHT AND/OR UTILITY POLE INCLUDING FOUNDATIONS. SEE ELECTRICAL PLAN AND COORDINATE ALL WORK WITH UTILITY OWNER.
- (16) REMOVE "HANDICAP PARKING" SIGN.
- (17) REMOVE AND RELOCATE "HORSE AND BUGGY PARKING" SIGN. SEE SITE LAYOUT PLAN FOR PROPOSED LOCATIONS.
- $\langle 18 \rangle$ REMOVE FLAGPOLE INCLUDING FOUNDATIONS.
- (19) REMOVE FENCE INCLUDING FOUNDATIONS.
- 20 REMOVE STORM STRUCTURE.
- 21 REMOVE STORM SEWER.
- 22 REMOVE GAS LINE. COORDINATE SHUT DOWN AND REMOVAL WITH UTILITY PROVIDER.
- 23 REMOVE WATER LINE. COORDINATE REMOVAL WITH UTILITY OWNER.
- 24 REMOVE SANITARY STRUCTURE.
- 25 REMOVE SANITARY LINE.
- 26 REMOVE ELECTRICAL STRUCTURE. COORDINATE WORK WITH UTILITY OWNER.
- 27 REMOVE ELECTRICAL LINE. COORDINATE WORK WITH UTILITY OWNER.
- 28 REMOVE COMMUNICATIONS LINE. COORDINATE WORK WITH UTILITY OWNER.
- (29) REMOVE WATER STRUCTURE. COORDINATE WORK WITH UTILITY PROVIDOR.
- $\langle 30 \rangle$ ABANDON SANITARY SEWER, FILL WITH FLOWABLE FILL AND BULKHEAD AT SANITARY STRUCTURE.
- (31) REMOVE PLAYGROUND AND SALVAGE FOR PROPOSED LOCATIONS. SEE SITE LAYOUT PLAN FOR NEW LOCATIONS.
- $\langle 32 \rangle$ REMOVE BIKE RACK INCLUDING FOUNDATIONS.
- $\langle 33 \rangle$ REMOVE TENNIS COURT NETS AND POSTS INCLUDING FOUNDATIONS.
- $\langle 35 \rangle$ REMOVE BLEACHERS AND SALVAGE FOR OWNER.
- (36) REMOVE BASEBALL BASES & PLUGS.
- $\langle 38 \rangle$ REMOVE SCOREBOARD INCLUDING FOUNDATIONS.
- $\langle 39 \rangle$ REMOVE FOUL POLE INCLUDING FOUNDATIONS.
- $\langle 40 \rangle$ REMOVE BASKETBALL GOAL POST INCLUDING FOUNDATIONS.
- 41 REMOVE BOLLARD INCLUDING FOUNDATIONS.
- 42 REMOVE "NO PARKING" SIGN.
- 43 REMOVE PLASTIC CURB.
- 44 REMOVE POST INCLUDING FOUNDATIONS.
- $\langle 45 \rangle$ REMOVE LANDSCAPE OUTCROPPING AND SALVAGE FOR OWNER.



12

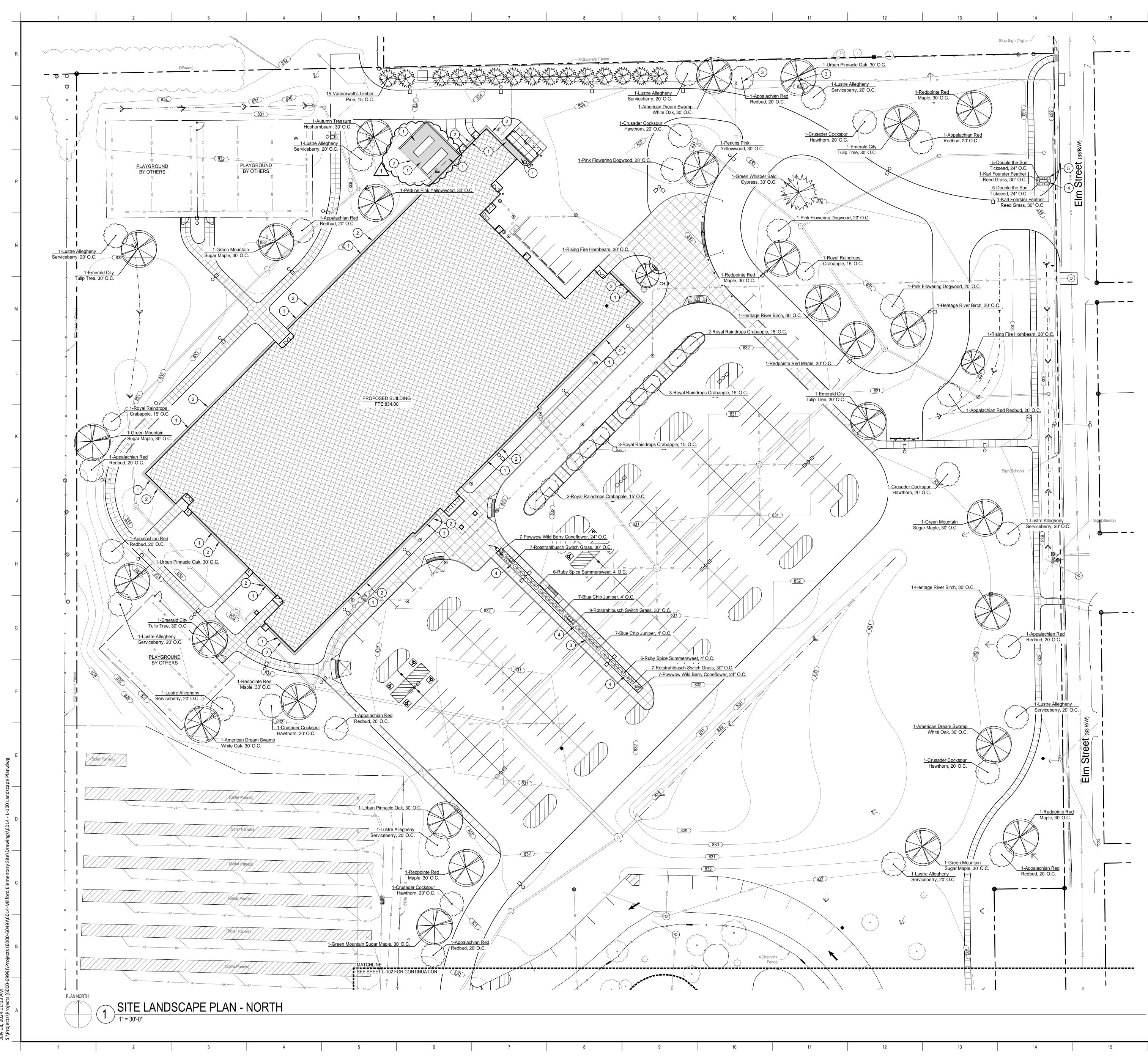
(46) ABANDON WELL. WORK TO BE DONE BY A LICENSED WELL DRILLER.

- (49) REMOVE AND RELOCATE "SPEED LIMIT 20" SIGN. SEE SITE LAYOUT PLAN FOR PROPOSED LOCATION.
- 47 SAWCUT AND REMOVE 12" MIN. OF ASPHALT PAVEMENT TO PROVIDE A CLEAN EDGE.

- $\langle 48 \rangle$ REMOVE PAVEMENT MARKINGS BY GRINDING.

- $\langle 34 \rangle$ REMOVE SAND / DIRT.
- 37 REMOVE CONCRETE BUMPER.

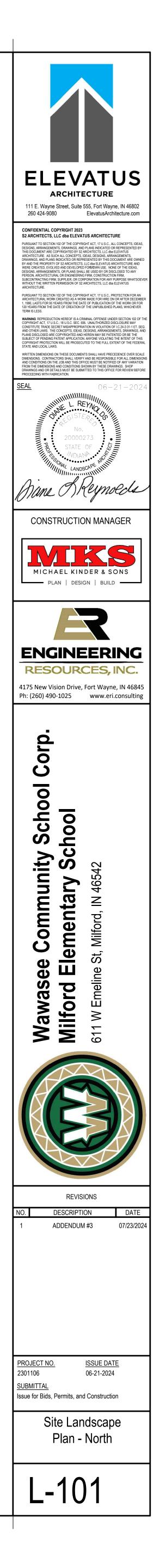


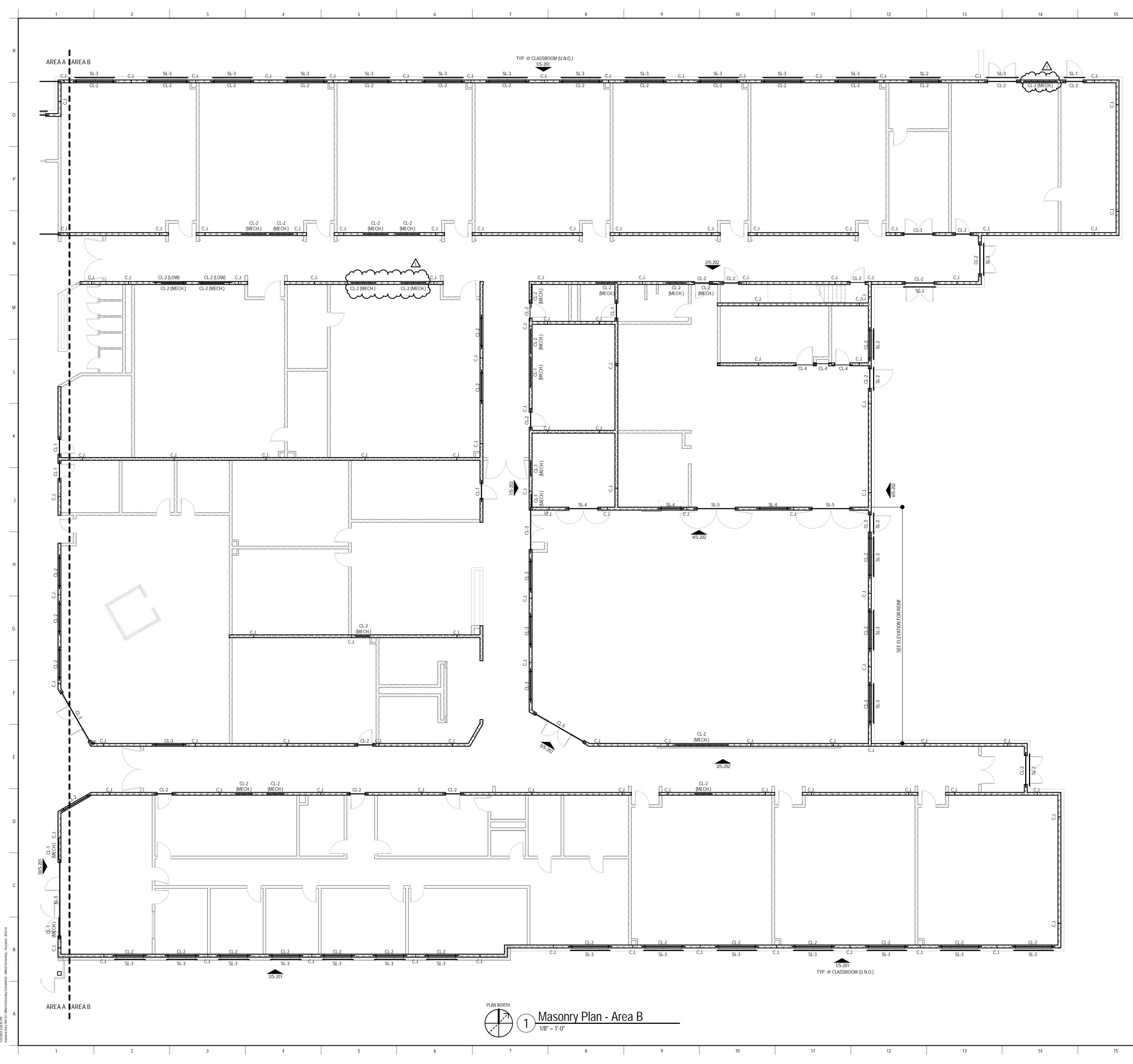


LANDSCAPE NOTES:

- 1 BEDS SHALL HAVE 3" OF RIVER ROCK MULCH (1/2" to 3/4" IN SIZE) OVER A WEED BARRIER. PROVIDE A NON-WOVEN FABRIC CONSISTING OF POLYPROPYLENE OR POLYESTER FABRIC, 3 OZ. PER SQ. YD. MIN. TO ALL STONE MULCH BEDS. COMPLETELY COVER AREA TO BE MULCHED-OVERLAPPING EDGES A MIN. OF 6". MULCH TO BE HELD 1" MIN. BELOW FINISH FLOOR AT BUILDING. MAINTAIN POSITIVE DRAINAGE AWAY FROM BUILDING.
- 2 ALL RIVER ROCK MULCH PLANTING BEDS LOCATED NEXT TO TURF AREAS SHALL HAVE A METAL EDGE PER DETAIL #5/L-102.
- 3 CAUTION! EXISTING UNDERGROUND UTILITY LINE. DIG WITH CAUTION AND ADJUST PLANT LOCATIONS IF UNDERGROUND UTILITY LINE IS IN DIRECT CONFLICT WITH PROPOSED PLANT LOCATION. IF PLANTS CANNOT BE LOCATED IN AREA DESIGNATED DUE TO UNDERGROUND UTILITY THEN COORDINATE NEW LOCATION WITH OWNER.
- 4 ALL PLANTING BEDS SHALL HAVE 3" OF HARDWOOD SHREDDED MULCH. MAINTAIN POSITIVE DRAINAGE. 5 ALL HARDWOOD MULCH PLANTING BEDS LOCATED NEXT TO TURF AREAS SHALL HAVE A TRENCH EDGE PER DETAIL
- #7/L-102. 6 COORDINATE ALL PLANTINGS WITH UNDERGROUND
- UTILITIES SEE SITE UTILITY PLAN. 7 INSTALL PERENNIALS PER PLANTING DETAILS #4/L-102.
- 8 INSTALL TREES PER PLANTING DETAILS #1/L-102 AND #2/L-102.
- 9 INSTALL SHRUBS PER PLANTING DETAIL #3/L-102. 10 INSTALL ORNAMENTAL GRASSES PER PLANTING DETAIL #6/L-102.
- 11 IF A DISCREPANCY IS FOUND BETWEEN THE QUANTITIES SHOWN ON THE PLANT LIST AND ON THE PLANTING PLAN,
- THAN THE PLANTING PLAN SHALL TAKE PRECEDENCE. 12 ONLY DELIVER PLANTS TO THE SITE WHEN PLANTING IS READY TO BEGIN. IF A DELAY ARISES OF MORE THAN 6 HOURS, MOVE PLANTS FROM PROPERTY TO A SHADED PROTECTED SITE, AND KEEP ROOTS MOIST. ALSO, ENSURE THE PLANTS ARE PROTECTED FROM MECHANICAL DAMAGE.







PLAN NOTES THIS SHEET: SEE ARCHITECTURAL DRAWINGS FOR ADDITIONAL DIMENSIONS AND WALL CONSTRUCTION INFORMATION. SEE S-501 FOR TYPICAL MASONRY DETAILS.

- CMU WALL LEGEND: EXTERIOR WALL, LOAD BEARING WALL, OR SHEAR WALL. SEE PLAN AND SCHEDULE FOR LINTEL TYPE AND SIZE. PROVIDE CONTROL JOINTS IN WALL AS INDICATED ON PLAN (LOCATIONS ARE APPROXIMATE - COORDINATE EXACT LAYOUT WITH MASONRY CONTRACTOR BASED ON CMU COURSING. MAXIMUM SPACING NOT TO EXCEED 25' - 0"). VERTICAL REINFORCING SHALL BE #4 BARS @ 48" O.C. (MAX.) UNLESS NOTED OTHERWISE ON PLANS OR ELEVATIONS. PROVIDE ADDITIONAL BARS AT CORNERS, INTERSECTIONS, OPENING JAMBS, AND CONTROL JOINTS AS SHOWN ON S-501. = INTERIOR PARTITION (NON-LOAD BEARING) WALL. SEE SCHEDULE ON S-501 FOR LINTEL SIZE (U.N.O. ON PLAN). PROVIDE CONTROL JOINTS IN WALL AS DIRECTED PER DETAIL #7/S-501 (CONTROL JOINTS ARE NOT SHOWN ON PLAN). VERTICAL REINFORCING SHALL BE <u>#4 BARS @ 96" O.C.</u> (MAX.) UNLESS NOTED OTHERWISE ON PLANS OR ELEVATIONS. PROVIDE ADDITIONAL BARS AT OPENING JAMBS AND CONTROL JOINTS AS SHOWN ON S-501. PROVIDE CONTINUOUS BOND BEAMS AS NOTED ON S-501.
- SEE FRAMING PLANS FOR BEAMS SPANNING ACROSS MASONRY OPENINGS AT FLOOR AND ROOF LEVELS. C.J. INDICATES CMU CONTROL JOINT IN EXTERIOR WALL, LOAD BEARING WALL, OR SHEAR WALL. SEE #7/S-501 FOR CONTROL JOINTS IN NON-LOAD BEARING CMU. SEE ARCHITECTURAL DRAWINGS FOR CONTROL JOINTS IN MASONRY/STONE VENEER.

	CMU LINTEL SCHEDULE											
MARK	SIZE (W X H)	REINFORCING (BOT. U.N.O.)	NOMINAL BEARING (EACH SIDE)	DETAIL REFERENCE								
CL-1	8"x8"	2-#4 BARS	8"	#11/S-501								
CL-2	8"x16"	2-#4 BOTTOM BARS & 2-#4 TOP BARS	8"	#11/S-501								
CL-3	8"x24"	2-#4 BOTTOM BARS & 2-#4 TOP BARS	8"	#11/S-501								
CL-4	8"x32"	2-#5 BOTTOM BARS & 2-#5 TOP BARS	8"	#11/S-501								
CL-5	8"x40"	2-#5 BOTTOM BARS & 2-#5 TOP BARS	8"	#11/S-501								

<u>NOTES:</u> 1. AT LOAD BEARING WALLS USE LINTEL SIZES NOTED BELOW FOR

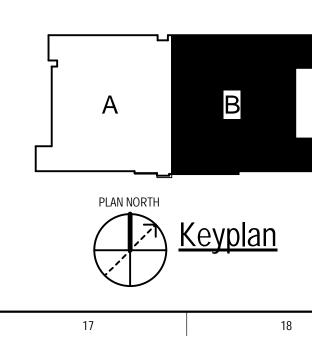
MECHANICAL OPENINGS (U.N.O.). A. MECHANICAL OPENINGS LESS THAN 12", LINTEL NOT REQD. UNLESS

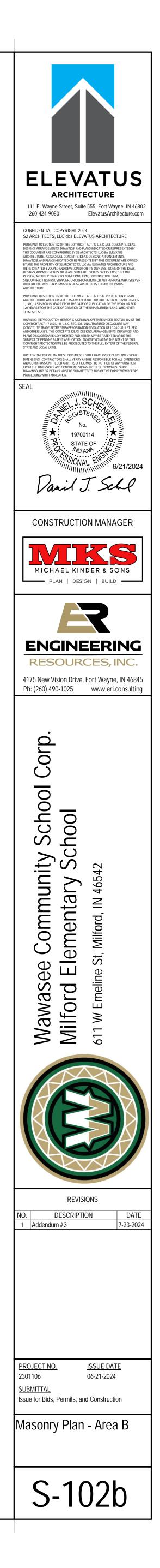
WITHIN 8" OF BEAM OR JOIST BEARING. B. MECHANICAL OPENINGS OVER 12" TO 24" WIDE, USE CL-1. C. MECHANICAL OPENINGS OVER 24" TO 32" WIDE, USE CL-2.

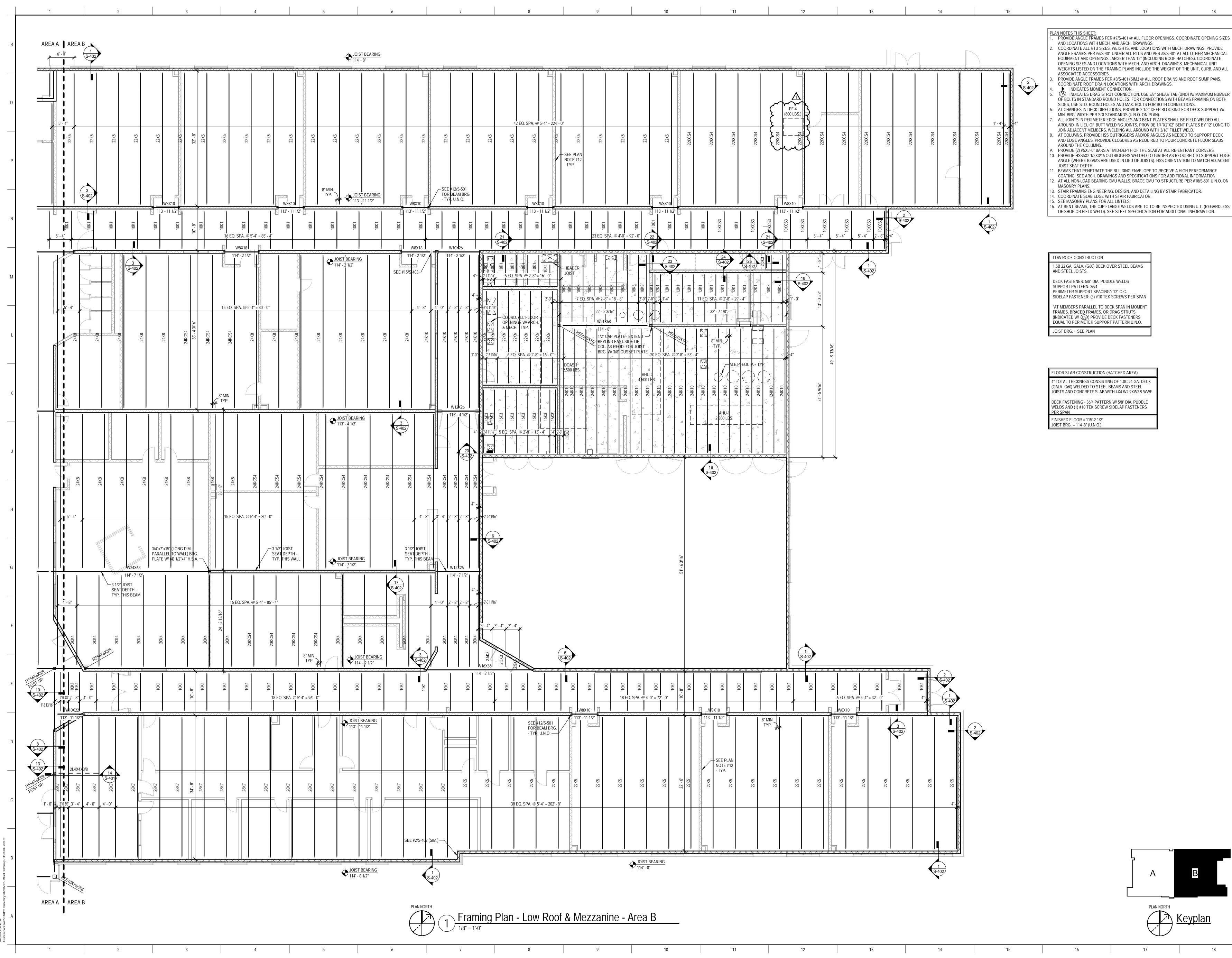
D. MECHANICAL OPENINGS GREATER THAN 32" WIDE, NOTIFY ENGINEER. 2. AT NON-LOAD BEARING WALLS SEE 15/S-501 FOR MECHANICAL OPENINGS.

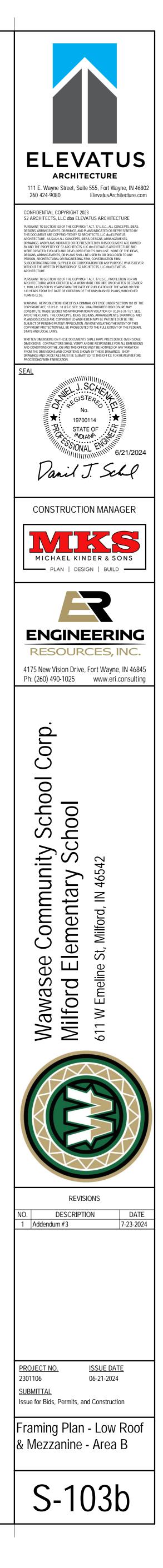
STEEL LINTEL SCHEDULE											
MARK	QUANTITY & SIZE	NOMINAL BEARING (EACH SIDE)	DETAIL REFERENCE								
SL-1	L4X4X5/16 (GALV.)	4"	NONE								
SL-2	L6X4X5/16 LLV (GALV.)	4"	NONE								
SL-3	L7X4X3/8 LLV (GALV.)	4"	NONE								
SL-4	W8X24 W/ 3/8"x7" PLATE	8"	#13/S-501								
SL-5	W16X26 W/ 3/8"x7" PLATE	8"	#13/S-501								
SL-6	HSS12X6X3/8 LLV W/ 3/8"x15" PLATE (GALV.)	8"	#14/S-501								
SL-7	W16X36	8"	#13/S-501								

NOTES: 1. FIT LINTEL SUCH THAT THE TIP OF TOE IS 1/2" BACK FROM OUTSIDE FACE OF BRICK, LOCATE BRICK TIES TO BACKUP AT FIRST BED JOINT ABOVE ANGLE'S VERTICAL LEG.











Primary Engineering, Inc. 2828 Lake Ave. Fort Wayne, Indiana 46805 260-424-0444 ph www.primary-eng.com

Addendum:

Date: 7/23/2024

3

Project: Milford Elementary School

Comm #: 23530

The following items shall be incorporated into the specifications and drawings and are considered to be integral to the bid documents for the project. Acknowledgement of receipt of this addendum is required on the bid form.

PE1030239

Question: Projector and Screen in Gymnasium is by Owner.

Item #1: Specification 221123.13 Domestic-Water Packaged Booster Pumps

A. Add QuantumFlo as an approved manufacturer.

Item #2: Specification 233300 Air Duct Accessories

A. Add Pottorff as an approved manufacturer.

Item #3: Specification 233600 Air Terminal Units

A. Add Krueger as an approved manufacturer.

Item #4: Specification 233723 HVAC Gravity Ventilators

A. Add ACME as an approved manufacturer.

Item #5: Specification 238126 Split System Air Conditioners

A. Add Daikin as an approved manufacturer.

Item #6: Specification 238219 Fan Coil Units

- **A.** Add Daikin as an approved manufacturer.
- **B.** Add Enviro-Tec as an approved manufacturer.

Item #7: Specification 281523 Intercom Entry Stations

A. Add Specification, Refer to attached for Specification.

Item #8: Specification 275116 Public Address Systems

A. 2.6 A Basis of Design 1. Crown Amplifiers: CDi Series Amplifiers.

Item #9: Specification 275116 Public Address Systems

- **A.** 2.7A SR1 1 Wireless Microphones 3 complete sets with rechargeable batteries and docking station for charging.
- B. 2.7A SR1 2 Antennas Shure/UAB with Proco mount P1019. Refer to attached Drawing E-401.

Item #10: Specification 275116 Public Address Systems

- **A.** 2.8 Equipment Cabinet: Full height, floor mounted, fully enclosed lockable cabinet.
- **B.** 2.8 D. Power sequencer by Furman or Surge X, quantity as required.

Item #11: Specification 275116 Public Address Systems

A. 2.9 Paging Adapter by Radio Design Labs(RDL) or equal.

Item #12: Specification 275116 Public Address Systems

A. 2.10 Loudspeaker JBL Pro Audio AE Series Speaker. These shall be selected by the sound contractor as the Ease modeling is being done for gym.

Item #13: Specification 275116 Public Address Systems

- A. Add 2.9A Sound Reinforcement.
 - Rooms with monitors.
 - Amp: EXTRON MPA 601 SERIES or equal
 - Speaker: OWI IC6 or equal
 - Page Interrupt: RDL Series
 - Provide and install cabling recommended by Manufacturer.
 - Refer to Detail on Drawings.

Item #14: Drawing Sheet M-202, "Mechanical and Plumbing Roof Plan"

A. Revise roof cap RC-7. Revise exhaust fan EF-4. Add exposed outdoor ductwork to EF-4. Exposed outdoor duct material shall be Type 304 stainless steel. Refer to attached drawing revision.

Item #15: Drawing Sheet M-301, "Enlarged Mechanical Plans"

- **A.** Add boiler room transfer grilles TG-3. Refer to attached drawing revision.
- **B.** Add louver L-3. Revise roof cap RC-7. Add 84x24 refrigerant exhaust duct with (4) EG-8 exhaust grilles. Relocate chiller remote evaporator. Revise EF-4. Add VSD-EF-4. Refer to attached drawing revision.

Item #16: Drawing Sheet M-304, "Mechanical Sections"

- A. Revise Mechanical Section 5. Refer to attached drawing revision.
- **B.** Revise Mechanical Section 6. Refer to attached drawing revision.

Item #17: Drawing Sheet M-501, "Mechanical Schedules"

- **A.** Exhaust Fan Schedule: Revise exhaust fan EF-4. Refer to attached drawing revision.
- **B.** Diffuser and Grille Schedule: Add exhaust grille EG-8. Refer to attached drawing revision.

Item #18: Drawing Sheet M-502, "Mechanical Schedules"

- **A.** Louver Schedule: Add louver L-3. Refer to attached drawing revision.
- **B.** Roof Cap Schedule: Revise roof cap RC-7. Refer to attached drawing revision.
- **C.** Variable Speed Drive Schedule: Add VSD-EF-4. Refer to attached drawing revision.
- **D.** Plate and Frame Heat Exchanger Schedule: Revise water pressure drop data to be PSI. Refer to attached drawing revision.

Item #19: Drawing Sheet E-202, "First Floor Power Plan – Unit B"

- **A.** Boiler Room 059 See revised plan. Added RMP refrigerant monitoring panel and circuit.
- **B.** Added VSD-EF4 in Rm 059.

Item #20: Drawing Sheet E-204, "Roof Electrical Plan"

A. Revised EF-4 location.

Item #21: Drawing Sheet E-401, "First Floor Systems Plan – Unit A"

- A. Gymnasium 043 Change note at PROJ symbol to be note 6.
- B. Gymnasium 043 Added audio inputs and wireless microphone antennas on west wall.

Item #22: Drawing Sheet E-402, "First Floor Systems Plan – Unit B"

- **A.** Added sound rack SR-2 in Storage 071 for Cafeteria 069.
- B. Added sound system speakers in Cafeteria.
- C. Added local inputs below AV2 on south wall of Cafeteria 069.
- **D.** Added sound reinforcement speakers for PROJ in Media Center 099.

Item #23: Drawing Sheet E-502, "Telecommunications Distribution Diagram and Elevations"

A. Added Detail 3 – Sound Rack #2 (SR2) Audio Riser Diagram – Cafeteria

Item #24: Drawing Sheet E-606, "Electrical Details"

A. Added detail sheet.

Item #25: Drawing Sheet E-701, "Electrical Schedules"

A. Equipment Schedule – Revised power requirements for EF-4. Added disconnect switch at unit and VSD (by MC) on wall in Rm 059.

Item #26: Drawing Sheet E-702, "Electrical Schedules"

A. Revised panel schedules H1 and L1 to reflect changes for EF-4.

Item #27: Drawing Sheet E-705, "Electrical Schedules"

A. Light Fixture Schedule – updated approved manufacturers.

Item #28: Drawing Sheet ES-201, "Electrical Site Plan"

A. Added sign power system.

SECTION 28 15 23 - INTERCOM ENTRY SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:1. Digital audio-video intercom entry systems.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Digital audio-video intercom entry systems.

B. Shop Drawings:

- 1. Project general notes.
- 2. Device layout.
- 3. Block diagram and cable.
- 4. System communications details.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturers' Published Instructions: Record copy of official installation **and testing** instructions issued to Installer by manufacturer for the following:
 - 1. Installation and startup instructions for intercom entry systems.
 - 2. Manufacturer's recommended tests and inspections for intercom entry systems.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts:
 - 1. Software and firmware service agreement.
- B. Warranty documentation.

1.5 WARRANTY

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed intercom entry system perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.
 - 1. Extended-Warranty Period: **Two** years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 DIGITAL AUDIO-VIDEO INTERCOM ENTRY SYSTEMS

- A. Description: This category covers digital audio-video intercom entry systems, together with controls and accessories for use with such operators, and similar devices.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Aiphone IX-DV(Surface Mount) or IX-DVF(Flush Mount) and IX-MV7-HB Hand Set.
- C. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
 - 2. Listing Criteria: UL CCN ALVY; including UL 294.

D. Options:

1. Operating Temperature: **Minus 29 to plus 140 deg F**. INTERCOM ENTRY SYSTEMS

- 2. Input Power: PoE.
- 3. Connectivity: Hardwired.
- 4. Minimum Ring Voltage: 25 V(ac rms).
- 5. Maximum Ring Voltage: 90 V(ac rms).
- 6. Speaker Volume: Approximately **70 dB** maximum at 1 m.
- 7. Materials: Stainless steel.
- 8. Finishes: Brushed stainless steel.
- 9. Climate: outdoor.
- 10. Mounting: Refer to drawings
- 11. Video Camera:
 - a. Display: 7 inch full-color touchscreen.
 - b. Camera Input Power: PoE.
 - c. Camera Field of View: 80 degrees horizontal, 60 degrees vertical, and 100 degrees diagonal.
 - d. Camera Tilt/Swivel Adjustment: Vertical plus-or-minus 20 degrees; horizontal plus-or-minus 30 degrees.

E. Accessories:

- 1. **Surface** and/or **Recessed** back box.
- 2. Mounting adaptor plate.
- 3. Mullion mounting bracket.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Special Techniques:
 - 1. Hardwired System:
 - a. Cable Type: **Unshielded**.
 - b. Maximum Power-over-Ethernet Cable Length: 300 ft.
- C. Interfaces with Other Work:
 - 1. Coordinate installation of new products for intercom entry systems with existing conditions.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Perform manufacturer's recommended tests and inspections.
- B. Nonconforming Work:
 - 1. System will be considered defective if it does not pass tests and inspections.
 - 2. Remove and replace defective units and retest.
- C. Collect, assemble, and submit test and inspection reports.

3.3 SYSTEM STARTUP

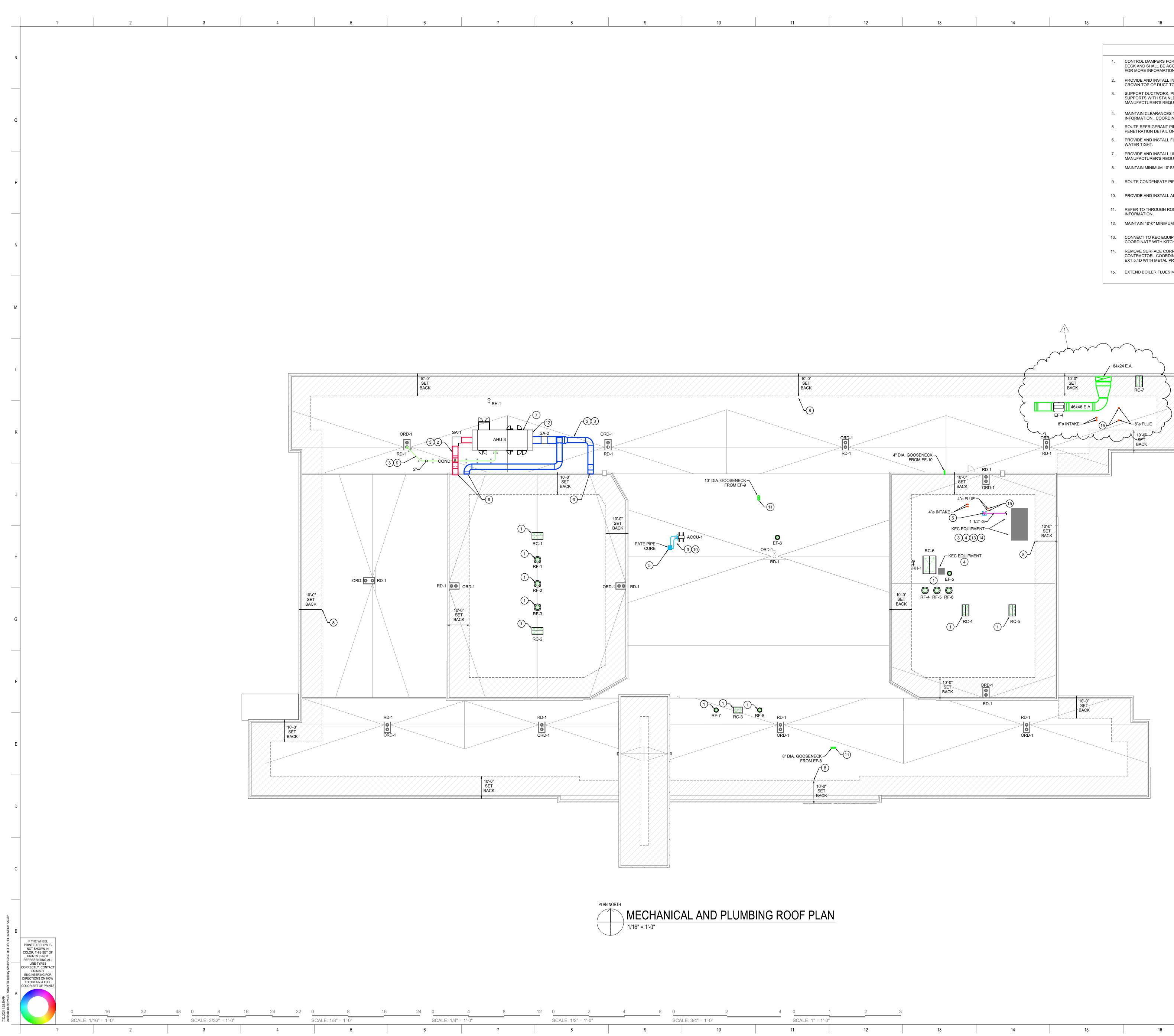
- A. Perform startup service.
 - 1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.4 PROTECTION

- A. After installation, protect intercom entry system from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.
- 3.5 MAINTENANCE
 - A. Software and Firmware Service Agreement:

- 1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for **two** years.
- 2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within two years from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.
 - a. Upgrade Notice: No fewer than **30** days to allow Owner to schedule and access the system.
- 3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION



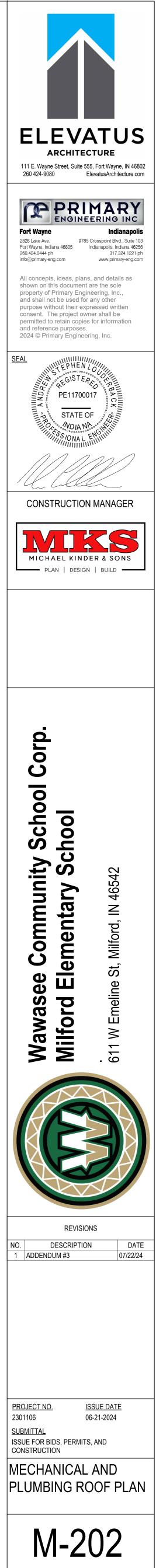
24 0	4	8	12	0 2	4	6	0	2	4	0	1
SCALE: 1/4" :	= 1'-0"			SCALE: 1/2" = 1'-0"			SCALE	E: 3/4" = 1'-0"		SCALE: 1" = 1'-0)''
6		7		8		9		10		11	

	PLAN NOTES	
1	CONTROL DAMPERS FOR THROUGH-ROOF DUCT PENETRATIONS SHALL BE LOCATED DECK AND SHALL BE ACCESSIBLE FROM ROOF. REFER TO EQUIPMENT SCHEDULES FOR MORE INFORMATION.	
2	PROVIDE AND INSTALL INSULATION AND ALUMINUM JACKETING ON ALL EXTERIOR DUCT ON TOP OF DUCT TO DRAIN WATER.	JCTWORK.
3	SUPPORT DUCTWORK, PIPING AND EQUIPMENT FROM ROOF USING B-LINE DURA-BLC SUPPORTS WITH STAINLESS STEEL HARDWARE. EXACT SIZES, SPACING, AND QUAN MANUFACTURER'S REQUIREMENTS TO MAINTAIN ROOF WARRANTY.	
4	MAINTAIN CLEARANCES TO KITCHEN EQUIPMENT. REFER TO FOOD SERVICE DRAWII INFORMATION. COORDINATE WITH KITCHEN EQUIPMENT CONTRACTOR.	NGS FOR N
5	ROUTE REFRIGERANT PIPING UP TO ROOF THROUGH PATE PIPE CURB. REFER TO R PENETRATION DETAIL ON DRAWING SHEET M403 FOR MORE INFORMATION.	OOF
6	PROVIDE AND INSTALL FLASHED PENETRATION WITH STAINLESS STEEL TOP DRIP EE WATER TIGHT.	GE SEALE
7	PROVIDE AND INSTALL UNIT ON 24" TALL INSULATED METAL ROOF CURB. MAINTAIN MANUFACTURER'S REQUIRED CLEARANCES FOR SERVICE AND AIRFLOW.	
8	MAINTAIN MINIMUM 10' SETBACK FROM ROOF EDGE.	
9	ROUTE CONDENSATE PIPING TO NEAREST ROOF DRAIN.	
10	PROVIDE AND INSTALL ALUMINUM JACKETING ON EXPOSED OUTDOOR PIPE INSULAT	ION.
1'	REFER TO THROUGH ROOF PENETRATION DETAIL ON DRAWING SHEET M401 FOR MOINFORMATION.	RE
12	MAINTAIN 10'-0" MINIMUM CLEARANCE FROM INTAKES TO FLUES, EXHAUST, AND PLU	MBING VEI

- 13. CONNECT TO KEC EQUIPMENT. REFER TO FOOD SERVICE DRAWINGS FOR MORE INFORMATION. COORDINATE WITH KITCHEN EQUIPMENT CONTRACTOR.
- 14. REMOVE SURFACE CORROSION AND PAINT EXPOSED OUTDOOR GAS PIPING. PAINTING BY GENERAL CONTRACTOR. COORDINATE WITH GENERAL CONTRACTOR. PAINT SHALL BE ALKYD SYSTEM MPI EXT 5.1D WITH METAL PRIMER AND (2) COATS FLAT GRAY ENAMEL.
- 15. EXTEND BOILER FLUES MINIMUM 3' ABOVE FORCED AIR INTAKES WITHIN 10'.



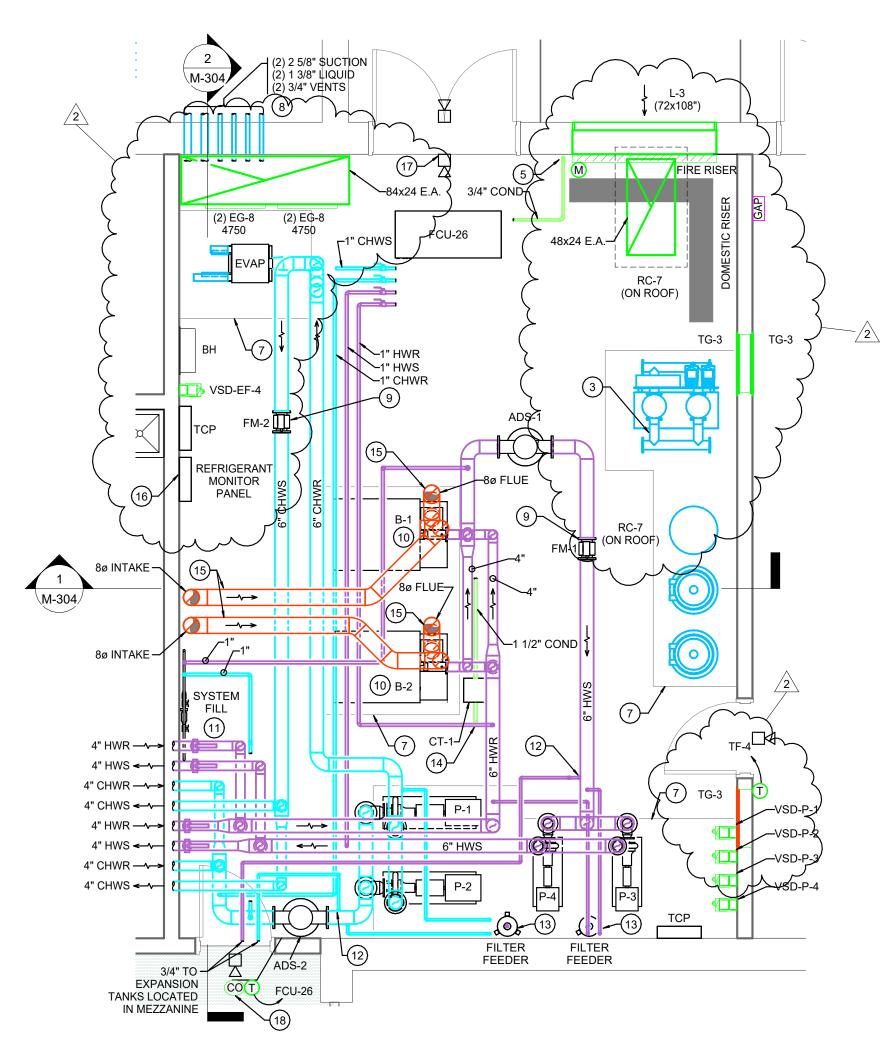
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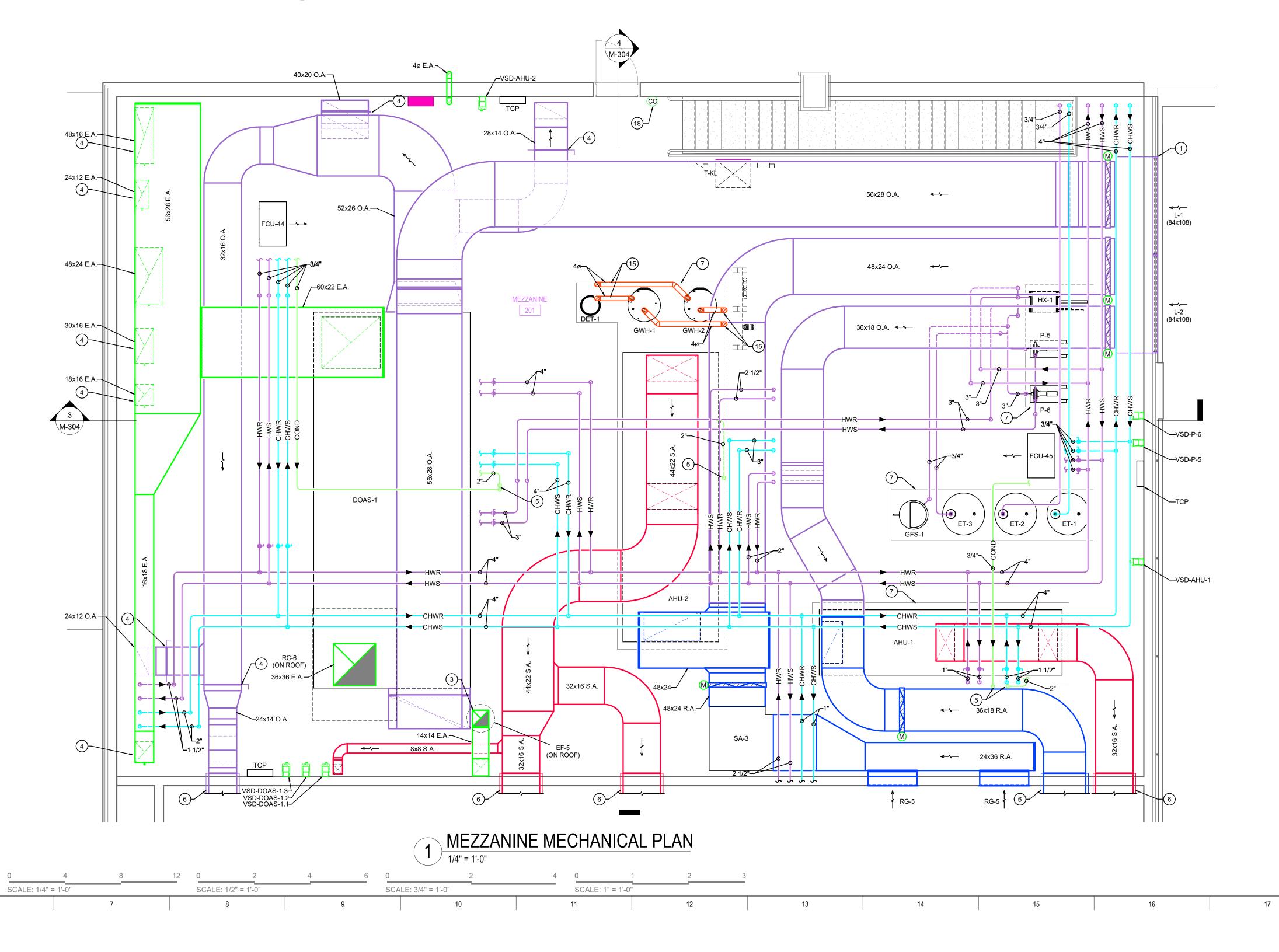
PRIMARY JOB # 23530

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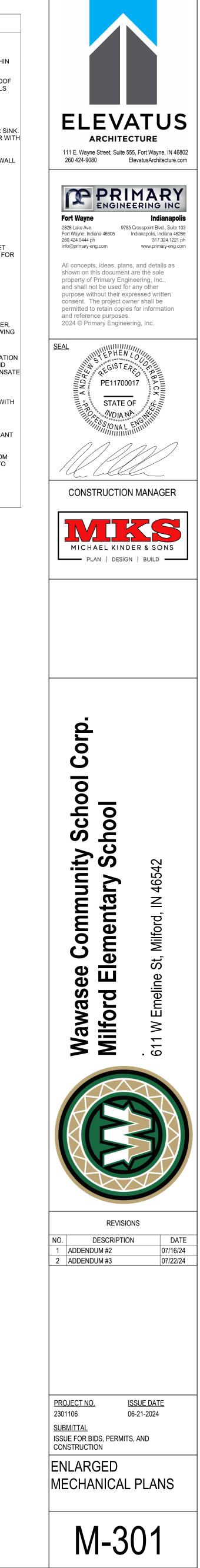
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tary School/23530 MILFORD ELEM	IF THE WHEEL PRINTED BELOW IS NOT SHOWN IN COLOR, THIS SET OF PRINTS IS NOT REPRESENTING ALL LINE TYPES CORRECTLY. CONTACT PRIMARY ENGINEERING FOR DIRECTIONS ON HOW TO OBTAIN A FULL COLOR SET OF PRINTS										
7/22/2024 1:38:37 PM Autodesk Docs://WCSC Milford Elementary School/23530 MILFORD ELEM MECH rv/23.rvt B	DIRECTIONS ON HOW TO OBTAIN A FULL COLOR SET OF PRINTS	0	16	32	48 0	8	16			8 16	240
7/2: Auti	1	SCALE: 1/1	6" = 1'-0"	2		ALE: 3/32" = 1'-0"			SCALE: 1/8" = 1'	-0" 5	SC 6



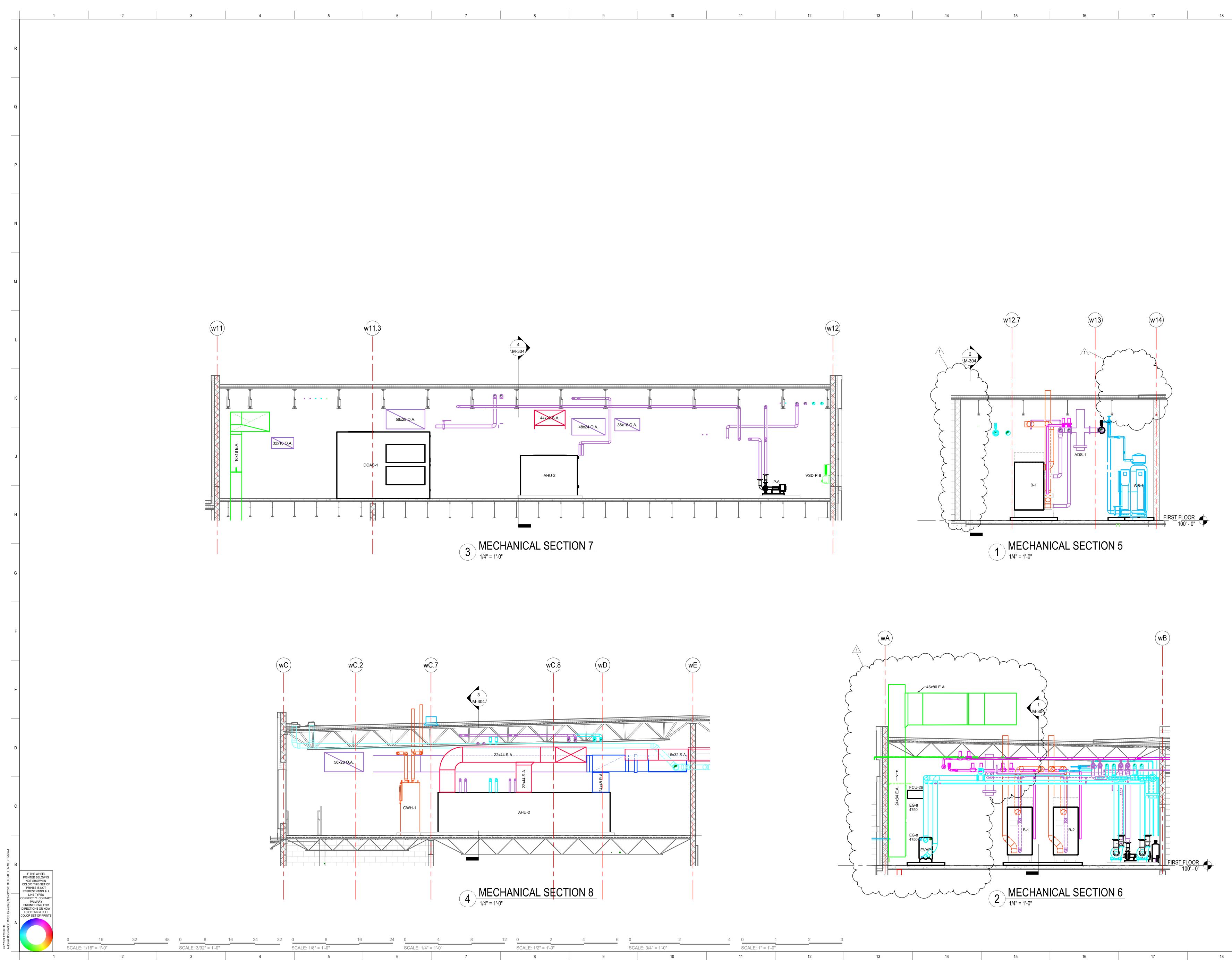


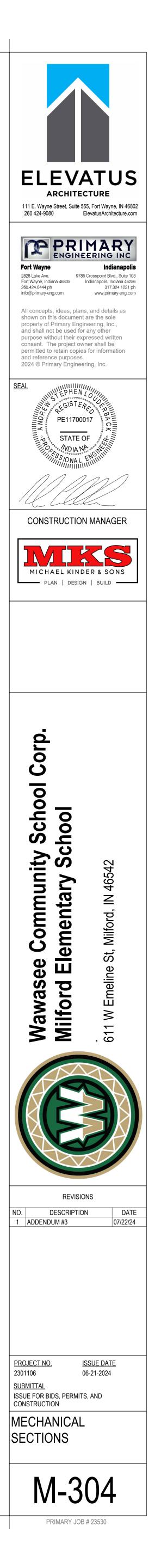


12	13	14	15	5	16	17	18
					P	LAN NOTES	
				1.	REFER TO LOUVER PLENUM DETAIL OF	N DRAWING SHEET M401 FOR	MORE INFORMATION.
)				2.	DUCT DROP TO FLOOR SHALL BE CON 7'-0" AFF MINIMUM.	STRUCTED OF 16 GAUGE GAL	VANIZED SHEET METAL WITHIN
				3.	CONTROL DAMPERS FOR THROUGH-R DECK AND SHALL BE ACCESSIBLE FRO FOR MORE INFORMATION.		
				4.	RECTANGULAR MANUAL OPPOSED BL/	ADE BALANCE DAMPER.	
GAP				5.	ROUTE COOLING COIL CONDENSATE F CUT GRATE TO RECEIVE CONDENSATE 1/2" THICK ELASTOMERIC RUBBER INS	E. COOLING COIL CONDENSA	
				6.	DUCT SHALL BE DOUBLE WALL WITH IN FOR FIELD PAINTING BY GC. COLOR S		T GRIP GALVANIZED OUTER WALL
				7.	PROVIDE AND INSTALL EQUIPMENT ON	I 4" TALL CONCRETE HOUSEK	EEPING PAD.
TG-3				8.	VERIFY PIPE SIZING AND ROUTING WIT	TH MANUFACTURER.	
				9.	PROVIDE AND INSTALL NEW FLOW ME REQUIREMENTS FOR ACCESS AND UP		
				10.	PROVIDE AND INSTALL MODULAR CON M401 FOR MORE INFORMATION. INSTA CLEARANCE, PIPING, AND VENTING.		
\square				11.	REFER TO SYSTEM FILL STATION DETA	AIL ON DRAWING SHEET M403	FOR MORE INFORMATION.
				12.	SIDE TAP MAIN FOR BRANCH PIPING TO	O EXPANSION TANK.	
				13.	PROVIDE AND INSTALL BYPASS FILTEF REFER TO WATER TREATMENT SPECIF SHEET M402 FOR MORE INFORMATION	FICATIONS AND CHEMICAL SH	
				14.	ROUTE BOILER FLUE CONDENSATE DF TANK CT-1. MODIFY CT-1 INLET AND O CONDENSATE PIPE FALL. DISCHARGE PIPE SHALL BE SCHEDULE 80 CPVC. C	UTLET CONNECTIONS AS REC DIRECTLY INTO NEAREST FL	QUIRED FOR TRAP DEPTH AND OOR DRAIN. BOILER CONDENSATE
				15.	ROUTE COMBUSTION AIR INTAKES AND BOILER MANUFACTURER AND VENTING COMBUSTION AIR INTAKES SHALL BE F	G MANUFACTURER. FLUES SH	HALL BE POLYPROPYLENE.
				16.	REFRIGERANT MONITORING PANEL. F CONTROL DIAGRAM ON DRAWING SHE		
				17.	REFRIGERANT MONITOR A/V ALARM W AND AT EACH ENTRANCE TO THE BOIL REFRIGERANT CONTROL DIAGRAM ON	ER ROOM. FURNISHED AND I	NSTALLED BY TCC. REFER TO
-VSD-P-1 -VSD-P-2				18.	CARBON MONOXIDE SENSOR BY TCC.		
-VSD-P-3							



PRIMARY JOB # 23530





1	2		3		4				5			
						E	XHA	UST	FAN	SCHE	EDU	LE
		TAG	AREA SERVED	MFR.	MODEL	CFM	TSP (IN W.C.)	MOTOR (HP)	MOTOR (BHP)	MOTOR (W)	RPM	DRIVE TYPE
		EF-1		GREENHECK	SQ-160-VG	2450	1.00	<u></u>	0.73		1265	DIRECT
	کم	EF-2			γSQ-130-VG γ	1450	1.00		* 0.46	γ •	1680	DIRECT
	(EF-3 EF-4	UNIT B REFRIGERANT	GREENHECK	SQ-130-VG QEI-33	1600 19000	1.00 1.50	3/4 7 1/2	0.52	-	1645 890	DIRECT
	2	EF-5	WAREWASH	GREENHECK	CUE-120-VG	1000	1.00	1/2	0.26	-	1440	DIRECT
	Ţ	EF-6	KILNBOOM /	GREENHECK	CUE-120-VG	1000	1.00	A/2	0.26	<u>k</u> - ~	1440	DIRECT
		EF-7		SKUTT	ENVIROVENT 2	140		-	<u> </u>			DIRECT
	2	EF-8	CLINIC	GREENHECK	SP-B200	200	0.50	-	-	172	980	DIRECT
		EF-9	ART ROOM	GREENHECK	SP-A710	400	0.50	-	-	285	1080	DIRECT
		EF-10	DRYER BOOSTER	FANTECH	DEDPV-75	75	1.10	-	-	70	2850	DIRECT
		RF-1	AHU-3 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-2	AHU-3 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-3	AHU-3 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-4	AHU-2 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-5	AHU-2 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-6	AHU-2 RELIEF	GREENHECK	G-180-VG	3000	0.50	1.0	0.52	-	935	DIRECT
		RF-7 RF-8	AHU-1 RELIEF AHU-1 RELIEF	GREENHECK	G-120-VG G-120-VG	1500	0.50	1/2	0.29	-	1470	DIRECT
		<u>пг-о</u>		GREENNECK	G-120-VG	1500	0.50	1/2	0.29	-	1470	DIRECT
		TF-1	IDF 035	GREENHECK	SQ-100-VG	1000	0.50	1/4	0.16	-	1525	DIRECT
		TF-2	ELECTRICAL 030	GREENHECK	SQ-100-VG	1000	0.50	1/4	0.16	-	1525	DIRECT
		TF-3	IT/ELEC 103	GREENHECK	SQ-100-VG	1000	0.50	1/4	0.16	-	1525	DIRECT
		DF-1	A-10-SP-STD-120-X	AIRIUS	A-10-SP-STD	-	_	_	-	16	860	
		DF-2	A-10-SP-STD-120-X	AIRIUS	A-10-SP-STD	-	-	-	-	16	860	
		DF-3	A-10-SP-STD-120-X	AIRIUS	A-10-SP-STD	-	-	-	-	16	860	
		DF-4	A-10-SP-STD-120-X	AIRIUS	A-10-SP-STD	-	-	-	-	16	860	
		DF-5	A-10-SP-STD-120-X	AIRIUS	A-10-SP-STD	-	-	-	-	16	860	
		REMARKS										
		2. PROVIE 3. PROVIE 4. CONTR 5. PROVIE 6. PROVIE 7. PROVIE 8. PROVIE 9. PROVIE 10. PROVIE 11. PROVI 12. COLOI 13. PROVI 14. PROVI 15. OUTD	DE AND INSTALL WITH F DE AND INSTALL WITH F DE AND INSTALL WITH P DE AND INSTALL WITH P DE AND INSTALL WITH P DE AND INSTALL WITH N DE AND INSTALL WITH N DE AND INSTALL WITH N DE AND INSTALL WITH DE AND INSTALL WITH	ACTORY WIRED N 4" TALL INSULATE ACCESSIBLE FRO LECTRONICALLY LUMINUM BIRDS EOPRENE VIBRA RAVITY BACKDRA II-PRO POLYESTE PILOTED WALL S SECONDARY LINT SECONDARY LINT SECONDARY LINT 6" POWER CORD, 120V DAMPER AC CONSTRUCTION, 1	EMA-3R ELECTR D METAL ROOF DM ROOF. DAMP COMMUTATED N CREEN. TION ISOLATION AFT DAMPER ON R COATING. WITCH. T TRAP. SAFETY CABLEY HORIZONTAL CO	RICAL DIS CURB W ER AND MOTOR W HANGEI FAN OU AND PS	SCONNEC /ITH HINGE ACTUATO WITH SPEE RS. ITLET. C MOVOR. RTION, BA	T SWITCH. ED BASE KIT R FURNISHI ED ADJUSTN	ED BY TCC. MENT DIAL (ED, WITH M			AND BEL

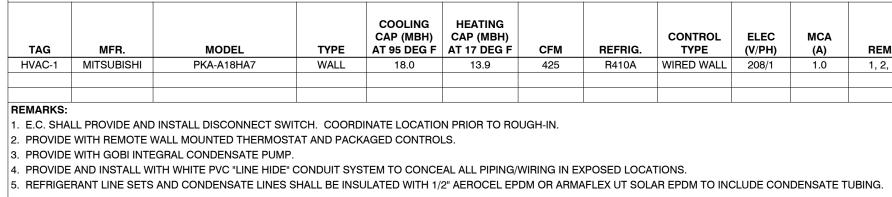
				EXPAN	SION T	ANK SC	HED
TAG	MFR.	MODEL	SERVICE	APPROX SYS VOL (GAL)	PRE-CHARGE (PSIG)	CALC. ACCEPT FACTOR	TANK VOL. (GAL)
ET-1	BELL & GOSSETT	B-1000	HOT WATER	3000	15	0.514	264
ET-2	BELL & GOSSETT	B-400	CHILLED WATER	3000	15	0.514	106
ET-3	BELL & GOSSETT	B-400	DOAS	300	15	0.514	106
	 I KS: VIDE AND INSTALL WI TANKS SHALL BE ASN			ON INLET.			

3. CONTRACTOR SHALL VERIFY SYSTEM STATIC WATER PRESSURE PRIOR TO INSTALLING TANK AND ADJUST PRE-CHARGE AS REQUIRED.

			WAT	ER FL	OW/ENE	ERGY I	METEF	R SCHI	
TAG	MFR.	FLOW METER	SENSOR TYPE	DISPLAY	SYSTEM SERVED	FLUID	PIPE SIZE (IN)	DESIGN NOMINAL FLOW	
FM-1	ONICON	F-3500	ELECTROMAG / INSERTION	SYSTEM 10	HOT WATER	WATER	6	380	
FM-2	ONICON	F-3500	ELECTROMAG / INSERTION	SYSTEM 10	CHILLED	WATER	6	360	
REMARKS									
1. PROVID	E WITH DISPLA	Y UNIT.							
2. CONTRA	ACTOR SHALL	VERIFY REQU	JIRED UPSTREAM AND DOWN	ISTREAM MINI	MUM STRAIGHT F	PIPE REQUIREN	MENTS DURING	3 INSTALL.	
3. PROVID	E FACTORY AU	ITHORIZED T	ECHNICIAN TO CALIBRATE AI	ND CONFIGUR	E METER FOR SP	PECIFIC PIPE/FI	LUID PARAMET	ERS.	

4. PROVIDE WITH HOT TAP ADAPTER. 5. TCC SHALL PROVIDE POWER TRANSFORMER DEDICATED TO POWER FLOWMETER.

MINI-SPLIT HVAC INDOOR UNITS COOLING HEATING CAP (MBH) CAP (MBH) CONTROL ELEC MCA AT 95 DEG F AT 17 DEG F TYPE TYPE CFM REFRIG (V/PH) 13.9 425 R410A WIRED WAI 1, 2, 3, 4, 5 WALL 18.0



MINI-SPLIT OUTDOOR UNIT SCI											
TAG	MFR.	MODEL	EQUIP. SERVED	COOLING CAP (MBH) AT 95 DEG F	HEATING CAP (MBH) AT 17 DEG F	MAX REF LINE LENGTH (FT)	COOLING SEER	HEA C			
ACCU-1	MITSUBISHI	PUZ-A18NKA7	HVAC-1	18.0	13.9	165	18.5	:			
REMARKS:				CONTROLS AS							

4. PROVIDE AND INSTALL WITH LOUVERED HAIL GUARD. 5. PROVIDE AND INSTALL ON 24" TALL MOUNTING STAND.

NEEDI EPOINT BIPOLAR IONIZER SCHEDULE

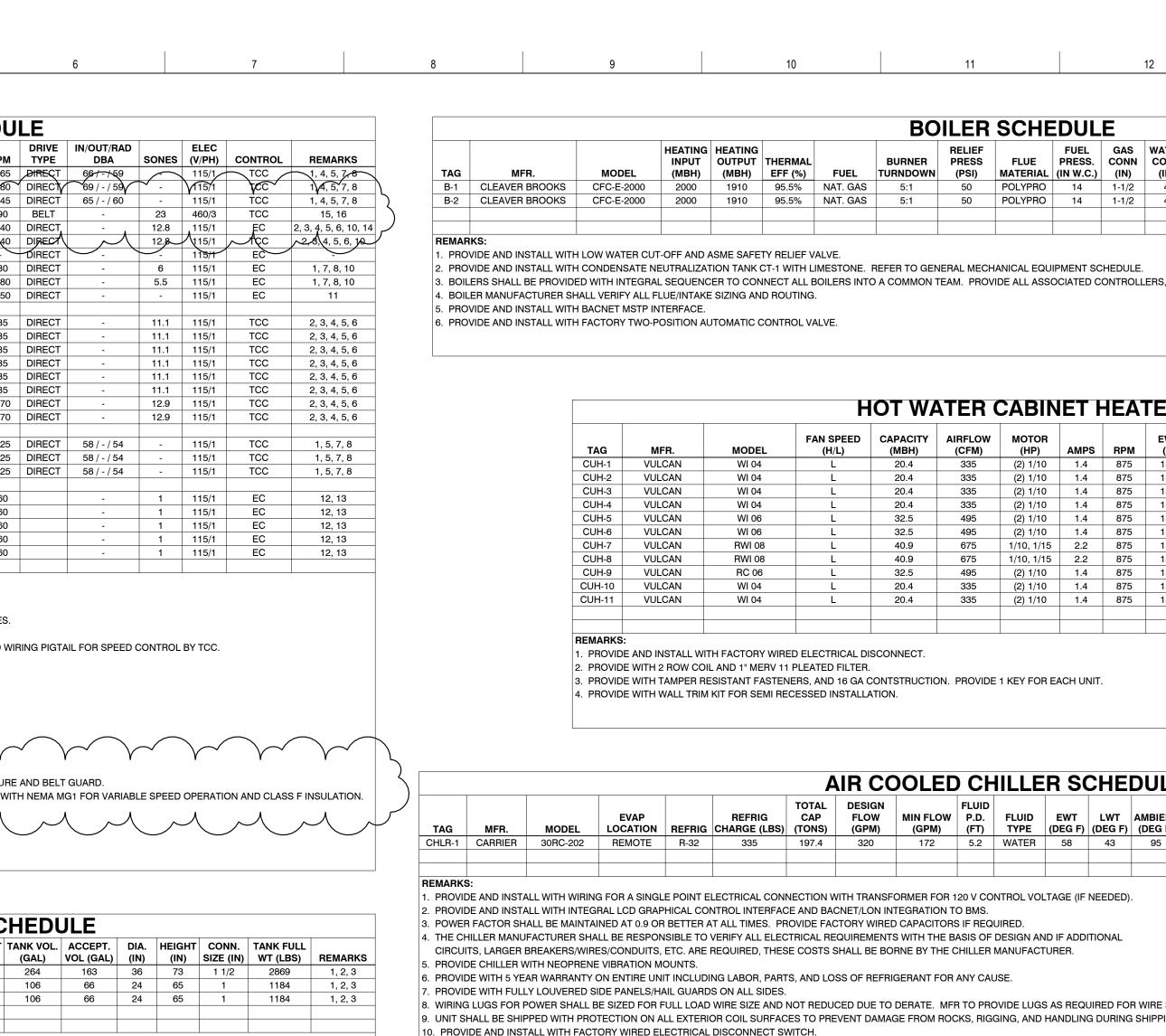
	Coll Airflow Coll Dim WxL ION OUTPUT OUTPUT MAX. CIR. MAX														
TAG	MFR.	MODEL	SERVICE	(CFM)	(IN)	(ions/cc/sec/inch)	VOLTAGE	ELEC	AMPS	FUSE	REMARKS				
NPI-1	GLOBAL PLASMA SOLUTIONS	GPS-IMOD	AHU-1	4,000	56x36	140 M	5 kV RMS	24 V	0.5	-	1, 2, 3, 4				
NPI-2	GLOBAL PLASMA SOLUTIONS	GPS-IMOD	AHU-2	10,000	82x52	140 M	5 kV RMS	24 V	0.5	-	1, 2, 3, 4				
NPI-3	GLOBAL PLASMA SOLUTIONS	AHU-3	10,000	96x66	140 M	5 kV RMS	24 V	0.5	-	1, 2, 3, 4					
REMA	EMA														
1. SYSTE	M SHALL COMPLY WITH UL299	8, UL 867, ANE	IAQP STANDAF	RDS WITH INDEPEN	NDENT TEST DATA	۹.									
2. PROVI	DE AND INSTALL WITH PACKAG	ED CONTROL	S.												
		RS AND ALL A	SSOCIATED CA	BLING REQUIRED 1	TO SERVE THE CO	DIL SIZE LISTED. INC	LUDE ALL REG	QUIRED MOUNTING	HARDWARED.	VOUNT ALL	DEVICES				

INSIDE UNIT. DOWNSTREAM OF FILTER. 4. TCC SHALL INSTALL NPI AND PROVIDE LOW-VOLTAGE POWER.

IF THE WHEEL PRINTED BELOW IS NOT SHOWN IN COLOR, THIS SET OF PRINTS IS NOT REPRESENTING ALL LINE TYPES CORRECTLY. CONTAC PRIMARY ENGINEERING FOR DIRECTIONS ON HOW TO OBTAIN A FULL COLOR SET OF PRINT

OLOR SET OF PRINT

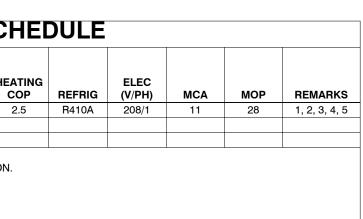
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11. PROVIDE AND INSTALL WITH COMPRESSOR SOUND BLANKET AND LOW SOUND FANS.

9

DULE	DULE														
/IN / MAX FLOW (GPM)	REQ PIPE DIA UP /DOWN STREAM	ACCURACY (% OF FLOW RATE)	ELEC (V/PH)	REMARKS											
15 / 1800	30D / 5D	1.0 %	24 VDC	1, 2, 3, 4, 5											
15 / 1800	30D / 5D	1.0 %	24 VDC	1, 2, 3, 4, 5											



7

8

6

NOTES 1. FOULING FACTOR SHALL BE 0.0001. 2. REFRIGERANT CHARGE DOES NOT INCLUDE PIPING TO REMOVE EVAPORATOR.

12. PROVIDE AND INSTALL WITH BACNET MSTP INTERFACE.

DIFFU NECK SIZE FA (IN) TITUS TMS TITUS TMS TITUS TMS TITUS TMS TITUS TBDI-80 TITUS 111RL TITUS 301RS-HD 30x6 TITUS FL-10 TITUS FL-30 TITUS 300RL 14x6 TITUS RG-1 45F RG-2 TITUS 45F TITUS 33RS 50FF TITUS RG-4 20x20 RG-5 TITUS 33RL 42x36 RG-6 TITUS 350RL TITUS TITUS TITUS 35 DEG. PDEFL 12x12 12x8 14x10 38 DEG. DEFL. 225 38 DEG. DEFL TITUS 32x14 38 DEG. DEFL 1145 REMARKS: 1. COLOR SHALL BE WHITE. 2. PROVIDE AND INSTALL WITH FRAME FOR SURFACE INSTALLATION. 3. PROVIDE AND INSTALL WITH FRAME FOR LAY-IN INSTALLATION. 4. PROVIDE AND INSTALL WITH INSULATED DISTRIBUTION PLENUM. 5. PROVIDE AND INSTALL WITH FACE OPERATED BUTTERFLY VOLUME DAMPER. 6. HINGED FILTER GRILLE, PROVIDE WITH 1" THICK MERV 11 FILTER AND 1ADDITIONAL SPARE. 7. STANDARD COLOR SELECTION BY ARCHITECT.

AIR AND SEDI MFR. MODEL BELL & GOSSETT ADS-1 CRS-6F ADS-2 BELL & GOSSETT CRS-6F BELL & GOSSETT ADS-3 CRS-3F RFMARKS 1. PROVIDE WITH REMOVABLE BOTTOM FLANGE, SKIMME 2. PROVIDE WITH INTEGRAL NEODYMIUM MAGNETIC INSE

11

10

8. FRAME TYPE 5, BORDER TYPE 55.

	GLYCOL FILL STATION SCHEDULE														
TAG	MFR.	MODEL	CAPACITY (GAL)	MAX. PRESSURE (PSI)	FLOW RATE (GPM)	MOTOR SIZE (HP)	ELEC (V/PH)	REMARKS							
GFS-1	BELL & GOSSETT	GMU60	55	60	5	3/4	120/1	1, 2							
REMARKS:															
1. PROVIDE	AND INSTALL WITH FUL	LY PIPED PRESS	URE SWITCH, P	RESSURE GAUGE, AN	ND LOW LEVEL A	LARM SYSTEM.									
2. PROVIDE	WITH AUXILLARY ALARM	I CONTACT FOR	LOW LEVEL FO	R BMS INTEGRATION											

12

12				13			14		15	16		17		18
_													-	
		DESIGN			TEN				TAG	AIK RA	AHU-2		DOAS-1	
CONN	ATER FLUE	T FLOW	FLOW			E ELEC			MFR.	CARRIER	CARRIER	CARRIER	CARRIER	
(IN) 1-1/2	(IN) (IN) 4 8	(GPM) 120	(GPM) 50	PD (F1 -	(DEG 20			REMARKS 1, 2, 3, 4, 5, 6	MODEL	39MN08W OFFICE	39MN21W CAFETERIA	39MW30W GYMNASIUM	39MN30W VENTILATION	
1-1/2	4 8	120	50	-	20	120/1	-	1, 2, 3, 4, 5, 6	LOCATION TYPE UNIT DIM LxWxH (IN)	INDOOR 208x56x36	INDOOR 248x82x52	OUTDOOR 242x96x66	INDOOR 322x142x90	
									UNIT WIEGHT (LBS)	2000000000	4475	6199	12489	
									FILTER AREA (S.F.) FILTER VELOCITY (FPM)	15.2 264	34.1 293	45.5 219	47.2 318	
HEDULE.									FILTER APD (IN W.C.)	0.15	0.17	0.1	0.13	
ONTROLLER	s, wiring, pro	DGRAMMIN	IG, SETUP	, ETC. FO	R A FUL	LY FUNCITO	ONAL SYSTEM.		DESIGN APD (IN W.C.) FILTER TYPE	0.5 2" PLEATED	0.58 2" PLEATED	0.55 2" PLEATED	0.56 2" PLEATED	
									FILTER EFF.	MERV 13	MERV 13	MERV 13	MERV 13	
									SUPPLY FAN AIRFLOW (CFM)	4000	10000	10000	15000	
									OUTSIDE AIR (CFM)	400	3750	3750	15000	
									TSP (IN W.C.) ESP (IN W.C.)	4.0	4.5	4.1 2.0	6.4 3.0	
									FAN RPM	2035	2150	2000	1845	
IEAII	ER SCI	HEDU	JLE						MOTOR POLES FAN TYPE	4 PL	PL	4 PL	4 PL	
	EWT/LWT	FLOW			с	ONTROL	ELEC		WHEEL DIAMETER (IN)	18.25	22.25	22.25	27	
RPM 875	(DEG F) 130 / 110	(GPM) 2.0	ROWS	FINS/F 144		VALVE 3-WAY	(V/PH) 115/1	REMARKS 1, 2, 3	FAN QUANTITY DRIVE TYPE	1 DIRECT	DIRECT	1 DIRECT	1 DIRECT	
875	130 / 110	2.0	2	144		2-WAY	115/1	1, 2, 3	MOTOR (HP)	5.0	15.0	15.0	25.0	
875 875	130 / 110 130 / 110	2.0 2.0	2	144 144		3-WAY 2-WAY	115/1 115/1	1, 2, 3 1, 2, 3	MOTOR (BHP) ELECTRICAL (V / PH)	3.6 208/3	10.9 208/3	10.1 208/3	19.05 208/3	
875	130 / 110	3.0	2	144		3-WAY	115/1	1, 2, 3	MODULATION	VSD	VSD	VSD	VSD	
875	130 / 110	3.0 4.0	2	144 144		2-WAY 3-WAY	115/1	1, 2, 3	EXHAUST FAN AIRFLOW (CFM)	-	-	-	15000	
875 875	130 / 110 130 / 110	4.0	2	144		2-WAY	115/1 115/1	1, 2, 3, 4 1, 2, 3, 4	TSP (IN W.C.)	-	-	-	4.0	
875	130 / 110	3.0	2	144		2-WAY	115/1	1, 2, 3	ESP (IN W.C.) FAN RPM	-	-	-	2.0	
875 875	130 / 110 130 / 110	2.0 2.0	2	144 144		3-WAY 2-WAY	115/1 115/1	1, 2, 3 1, 2, 3	MOTOR POLES	-	-	-	4	
									FAN TYPE WHEEL DIAMETER (IN)	-	-	-	PL 27	
									FAN QUANTITY	-	-	-	1	
									DRIVE TYPE MOTOR (HP)	-	-	-	DIRECT 20.0	
									MOTOR (BHP)	-	-	-	14.8	
									ELECTRICAL (V / PH) MODULATION	-	-	-	208/3 VSD	
									HOT WATER PRE HEAT COIL	4000	10000	40000	15000	
									AIRFLOW (CFM) FLUID	4000 WATER	10000 WATER	10000 WATER	15000 30% PG	
										67	599	599	855	
HEDU	IF								EAT / LAT (DEG F) EWT / LWT (DEG F)	60 / 75 130 / 110	40 / 95 130 / 110	40 / 95 130 / 110	-10 / 40 120 / 100	
									COIL FLOW (GPM)	7	60	60	87	
WT AMB			ELEC (V/PH)	MCA	МОР	OP. WEIGHT	DEM	ARKS	FLUID VELOCITY (FPS) WPD (FT)	1.4	3.1	3.1 4.4	3.5 8.2	
43 9			460/3	MCA 424	450			инкэ 7, 8, 9, 10, 11, 12	APD (IN W.C.)	0.18	0.43	0.43	0.18	
									ROWS FINS/FT	1 108	3 108	3 108	2 108	
										2-WAY	3-WAY	3-WAY	3-WAY	
EDED).									HOT WATER RE HEAT COIL AIRFLOW (CFM)	-	5000	5000	15000	
									FLUID	WATER	WATER	WATER	WATER	
NAL									TOTAL CAP (MBH) EAT / LAT (DEG F)	-	124 55 / 75	124 55 / 75	381 55 / 75	
									EWT / LWT (DEG F) COIL FLOW (GPM)	-	130 / 110 12	130 / 110 12	130 / 110 38	
									FLUID VELOCITY (FPS)	-	3.7	3.7	1.5	
D FOR WIR	E SIZE SHOWN	ON PLANS	6.						WPD (FT) APD (IN W.C.)	-	8.5 0.19	8.5 0.19	1.6 0.26	
URING SHIP	PING, HANDLIN	IG, AND INS	STALLATIO	DN.					ROWS	-	1	1	2	
									FINS/FT CONTROL VALVE	-	108 2-WAY	108 2-WAY	84 2-WAY	
									CHILLED WATER COIL	-	2-WAT	2-WA1	2-WAT	
									AIRFLOW (CFM) FLUID	4000 WATER	10000 WATER	10000 WATER	15000 WATER	
									TOTAL CAP (MBH)	147	494	494	731	
									SENS CAP (MBH) EAT DB/WB (DEG F)	105 77 / 65	337 83 / 68	337 83 / 68	473 80 / 67	
									LAT DB/WB (DEG F)	53 / 53	52 / 52	52 / 52	52 / 52	
									EWT / LWT (DEG F) COIL FLOW (GPM)	43 / 58 20	43 / 58 84	43 / 58 84	43 / 58 98	
		<u></u>		<u></u>	<u> </u>	_			FLUID VELOCITY (FPS)	2.4	3.2	3.2	3	
19FK		aKILL	<u> </u>		וטע	<u> </u>			WPD (FT) APD (IN W.C.)	5.9 0.87	8.6 0.92	8.6 0.92	6 1.07	
ACE SIZE			мах	MAX APD	THROW	мах			ROWS	8	8	8	8	
(IN)	THROW PA		CFM	(IN)	(FT)	NC	MATERIAL	REMARKS	FINS/FT CONTROL VALVE	108 3-WAY	108 3-WAY	108 2-WAY	144 3-WAY	
12x12 24x24	4-WA 4-WA		100 245	0.03	6 9	20 15	STEEL STEEL	1, 2		•				
24x24	4-WA		400	0.06	19	13	STEEL	1, 3	REMARKS:	1, 2, 3, 4, 5, 6, 7, 8 9, 12	8, 1, 2, 3, 4, 5, 6, 7, 8, 9, 12	1, 2, 3, 4, 5, 6, 7, 8, 9, 12	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13	
24x24 24x24	4-WA 4-WA		785 1070	0.11	11 14	31 33	STEEL STEEL	1, 3 1, 3	REMARKS:		,	, -	. , ,	
48x10	(4) 1-1/2" SLC SINGLE [380	0.11	23	31	STEEL STEEL	1,4	1. CASING SHALL BE 2" THICK DOUB 1. +/- 8" W.C. STATIC PRESSURE CLA					
26x16 32x8	SINGLE I SINGLE I		1715 770	0.07	42 36	29 27	STEEL	2, 7 2, 7	2. PROVIDE AND INSTALL ON 6" HIGH	I FULL LENGTH B	ASE RAIL.			
-	(1) 1" SLOT		165	0.14	15	26 27	STEEL STEEL	1, 2, 8	3. MOTORS SHALL BE MULTI-TAP 460 MG1 FOR VARIABLE SPEED OPERA		SUPER-E WITH INTEGR	AL SHAFT GROUNDI	NG RING AND COMPL	Y WITH NI
- 16x8	(1) 3" SLOT DBL. DE		500 380	0.18 0.2	22 11	27 28	STEEL	1, 2, 8 1, 2	4. MOTORS SHALL HAVE CLASS F INS	SULATION FOR US		ED DRIVE.		
						45			5. REFER TO DRAWING DETAILS FOR 6. CHILLED WATER COIL CASING SH					
12x12 24x24	45 DEG 45 DEG		400 1600	0.04	-	15 15	ALUMINUM	1, 2	7. ALL COIL HEADERS SHALL BE RED	BRASS.				
50x26	38 DEG. I EGG/FIL		3050 800	0.04	-	23 30	STEEL ALUMINUM	2,7	8. DRAIN PAN SHALL BE IAQ SLOPE I 9. FURNISH WITH NEEDLEPOINT BIP				SCHEDULF	
24x24 44x38	38 DEG. I		800 5050	0.2 0.01	-	30 32	STEEL	1, 3, 6 2, 7	10. PROVIDE AND INSTALL WITH 24"	TALL INSULATED	METAL ROOF CURB CO	INSTRUCTED TO SUF	PORT AIR HANDLER A	
20x12	35 DEG. I	DEFL.	440	0.01	-	10	STEEL	1, 2	11. PROVIDE AND INSTALL WITH INSI 12. PROVIDE AND INSTALL WITH ION		,		,	ACCESS
12x12	45 DEG	EGG	400	0.04	-	15	ALUMINUM	1, 2	13. PROVIDE AND INSTALL WITH ENE					MORE
24x24	45 DEG 35 DEG. I		1600	0.04	-	15 10	ALUMINUM	1,3	PL=PLENUM, AF=AIRFOIL, FC=FORA	RD CURVE, BI=B	ACKWARD INCLINED			
14x10 25x50	38 DEG. I	DEFL.	230 3055	0.01	-	23	STEEL	1, 2	TPFT=TOP FRONT, TPBK=TOP BACK	, FTTP=FRONT TO	OP, FTBT=FRONT BOTT	ГОМ		
22x22	45 DEQ. 1		1030	0.01	<u>_</u> -	- V · · ·		L 1,2	BTFT=BOTTOM FRONT, BTBK=BOTT	OM BACK, SD=SI	DE			
12x12	γ 35 DEG.Υ		γ ₂₄₀	0.03¥	-	V ₁₀	ALUMINUM	¥ 1,2	<u>ک</u>					

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SERVICE	PIPE CONN. (IN)	MAX FLOW (GPM)	TANK DIA (IN)	TANK HEIGHT (IN)	WATER VOL (GAL)	REMARKS
OT WATER	6	550	12.75	41	23	1, 2
LED WATER	6	550	12.75	41	23	1, 2
DOAS-1	3	138	6.63	25.63	4	1, 2

0.04

1, 2

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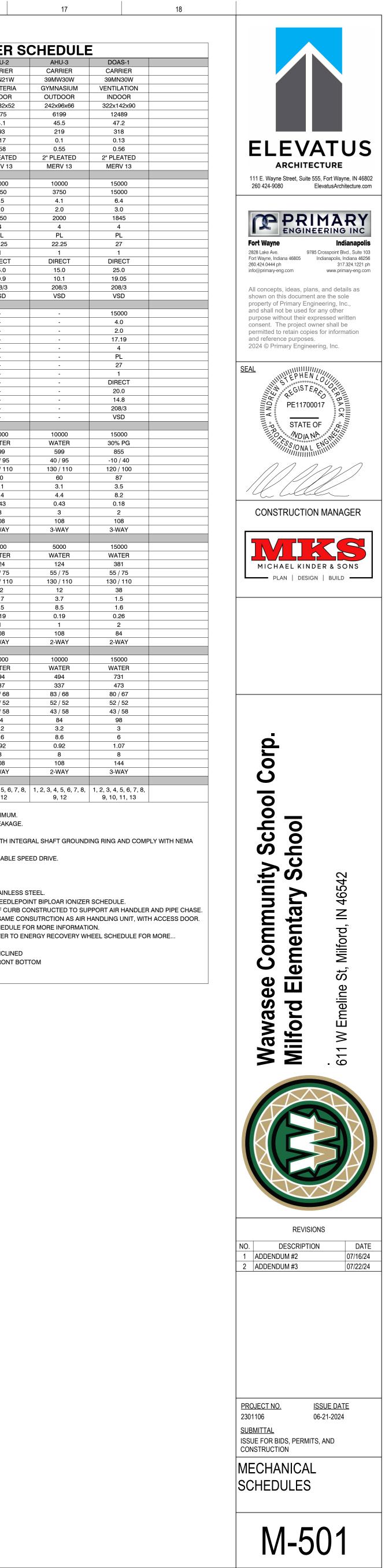
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STEEL

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STEEL

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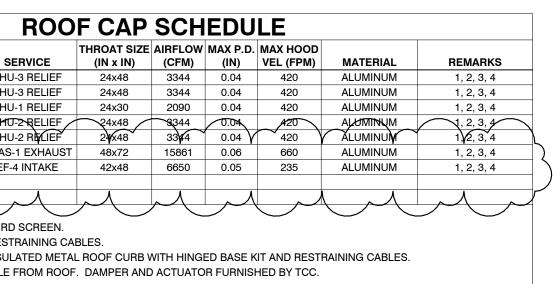


PRIMARY JOB # 23530

	1 2 3 4 5 6 7 8	
	HYDRONIC PUMP SCHEDULE	
	TAG MFR. MODEL FRAME IMPELLER FLUID FLUID MOTOR MOTOR EFF PUMP MOTOR ELC MOTOR MOTO	
	REMARKS: 1. ALL MOTORS SHALL BE NON-OVERLOADING. 2. MOTOR SHALL BE MULTI-TAP 460/240/208 BALDOR SUPER-E WITH INTEGRAL SHAFT GROUNDING RING AND COMPLY WITH NEMA MG1 FOR VARIABLE SPEED OPERATION. 3. MOTOR SHALL HAVE CLASS F INSULATION FOR USE WITH VARIABLE SPEED DRIVE. 4. MFR SHALL ALIGN PUMP SHAFT IN THE FIELD, PRIOR TO START-UP. PROVIDE WRITTEN REPORT OF ALIGNMENT AND STARTUP. 5. PROVIDE WITH IMPELLER SIZE LISTED, VSD WILL BE USED TO BALANCE FLOW TO DESIGN POINT. 6. LEAD-LAG PARALLEL PUMPING OPERATION FOR COMBINED FLOW AT 400 GPM AND 100 FEET HEAD.	
	RAD-1VULCANPR3F-0654100WIDT <th colspa<="" td=""></th>	
	REMARKS: 1. ALL CAPACITIES BASED ON ROOM AIR TEMPERATURE OF 65 DEG F. 2. PROVIDE AND INSTALL WITH ALL END CAPS/TRIM PIECES FOR COMPLETE INSTALLATION. REFER TO PLANS FOR ADDITIONAL INFORMATION.	
-	ROOF CAP SCHEDULETAGMFR.MODELSERVICEAIRFLOW (IN x IN)MAX P.D. (CFM)MAX HOOD VEL (FPM)MATERIALREMARKSRC-1GREENHECKFGRAHU-3 RELIEF24x4833440.04420ALUMINUM1, 2, 3, 4	
	1 IND-1 GREENHECK FGR AHU-3 RELIEF 24x48 3344 0.04 420 ALUMINUM 1, 2, 3, 4 RC-3 GREENHECK FGR AHU-1 RELIEF 24x48 3344 0.04 420 ALUMINUM 1, 2, 3, 4 RC-4 GREENHECK FGR AHU-2 RELIEF 24x48 3344 0.04 420 ALUMINUM 1, 2, 3, 4 RC-5 GREENHECK FGR AHU-2 RELIEF 24x48 3344 0.04 420 ALUMINUM 1, 2, 3, 4 RC-5 GREENHECK FGR AHU-2 RELIEF 24x48 3344 0.04 420 ALUMINUM 1, 2, 3, 4 RC-6 GREENHECK FGR DOAS-1 EXHAUST 48x72 15861 0.06 660 ALUMINUM 1, 2, 3, 4 RC-7 GREENHECK FGI EF-4 INTAKE 42x48 6650 0.05 235 ALUMINUM 1, 2, 3, 4	
_	BEMARKS: 1. PROVIDE WITH ALUMINUM WIRE MESH BIRD SCREEN. 2. PROVIDE WITH HINGED BASE KIT AND RESTRAINING CABLES. 3. PROVIDE AND INSTALL WITH 24" TALL INSULATED METAL ROOF CURB WITH HINGED BASE KIT AND RESTRAINING CABLES. 4. CONTROL DAMPER SHALL BE ACCESSIBLE FROM ROOF. DAMPER AND ACTUATOR FURNISHED BY TCC.	
	SOUND ATTENUATOR SCHEDULE	
_	TAGMFR.MODELSERVICEAIR VEL. (CFM)AIR VEL. (IN W.C.)AIR VEL. 63AIR VEL. 100AIR VEL. 100<	
	SA-2 PRICE RM36/WA AHU-3 RETURN 10000 1110 0.06 4 4 6 11 8 6 6 3 1 SA-3 PRICE ERM62/ZA AHU-2 RETURN 10000 1250 0.15 7 9 11 16 19 17 15 12 1 REMARKS: Image: Comparison of the comparison o	
_	VARIABLE SPEED DRIVE SCHEDULE	
	TAGMFR.MODELEQUIPMENT SERVEDMOTOR SIZE (HP)ELEC (V/PH)MAX HARMONIC DIST.BYPASSENCLOSUREREMARKSVSD-AHU-1ABBACH580AHU-15.0460/35%NONENEMA 11, 2, 3, 4VSD-AHU-2ABBACH580AHU-215.0460/35%NONENEMA 11, 2, 3, 4	
_	VSD-AHU-3 ABB ACH580 AHU-3 15.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-DQAS-1.1 ABB ACH580 DOAS 1 25.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-DQAS-1.2 App April 560 DOAS 1 20.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-DQAS-1.2 App April 580 DOAS 1 20.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-DQAS-1.3 ABB ACH580 DOAS 1 1/3 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-DAS-1.3 ABB ACH580 EF-4 7 1/2 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-PL ABB ACH580 P-1 20.0 460/3 5% NONE MEMA 1 1, 2, 3, 4 VSD-P-2 ABB ACH580 P-2 20.0 460/3 5% NONE NEMA 1 1, 2, 3, 4	
	VSD-P-2 ABB ACH300 F-2 20.0 400/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-3 ABB ACH580 P-3 10.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-4 ABB ACH580 P-4 10.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-5 ABB ACH580 P-5 5.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-6 ABB ACH580 P-6 5.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-6 ABB ACH580 P-6 5.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-6 ABB ACH580 P-6 5.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 VSD-P-6 ABB ACH580 P-6 5.0 460/3 5% NONE NEMA 1 1, 2, 3, 4 REMARKS: Image: Compare to the state of the	
	 REFER TO SPECIFICATIONS FOR FURTHER REQUIREMENTS AND INFORMATION. COORDINATE EXACT MOTOR DATA WITH APPROVED EQUIPMENT SHOP DRAWINGS AND PRODUCT DATA SUBMITTALS. PROVIDE WITH MANUAL LOCKABLE DISCONNECT SWITCH INTEGRAL TO DRIVE. PROVIDE WITH BACNET INTERFACE FOR FULL INTEGRATION INTO BMS. 	
3	VARIABLE AIR VOLUME TERMINAL SCHEDULE MAX MIN MAX	
-	TAGMFR.MODELTYPEMIN COOLING AIR (CFM)COOLING AIR (CFM)HEATING AIR (CFM)INLET S.P.DOWNSTRM S.P.INLET SIZE (IN)HEATING (MBH)FLOW (GPM)COIL ROWSAIR P.D. (IN)CONTROL VALVEREMARKSVAV-1TITUSDESVSO2408002408001.00.25934.74.0040.450.422.WAY1.2VAV-2TITUSDESVSO1204001204001.00.25617.45.0033.310.302.WAY1.2VAV-3TITUSDESVSO1204001204001.00.25617.45.0033.310.302.WAY1.2VAV-4TITUSDESVSO2207502257501.00.25934.74.0040.450.422.WAY1.2VAV-4TITUSDESVSO22408001.00.25617.45.0033.310.302.WAY1.2VAV-4TITUSDESVSO2257501.00.25934.74.0040.450.422.WAY1.2VAV-5TITUSDESVSO2257501.00.25832.68.0042.430.712.WAY1.2VAV-6TITUSDESVSO2709001.00.259	
	NY 0 HIGO DEST CO LIC CO LIC CO CO CO CO LIC CO CO <thco< th=""> <thco< td="" tr<=""></thco<></thco<>	
_	NOTES: 1. HEATING CAPACITIES BASED ON 55 DEG F ENTERING AIR, 90 DEG F LEAVING AIR, 130 DEG F ENTERING WATER, AND 110 DEG F LEAVING WATER TEMPS. SO = SHUTOFF	
_		
-		
PRINTED BELO NOT SHOWN COLOR, THIS SE PRINTS IS NO REPRESENTING LINE TYPES	N IS N T OF T ALL	
CORRECTLY. COI PRIMARY ENGINEERING DIRECTIONS ON TO OBTAIN A F COLOR SET OF P	TACT FOR HOW JL	
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												F	AN CO	OIL	SCH	EDULE													
								COOLING									HEATING												
TAG	MFR.	MODEL	AIRFLOW (CFM)	SPEED	O.A. (CFM)	ESP (IN WC)	HP	TOTAL (MBH)	SENS. (MBH)	EDB / EWB (DEG F)	LDB / LWB (DEG F)	EWT / LWT (DEG F)	FLOW (GPM)	WPD (FT)	ROWS	CONTROL VALVE	TOTAL (MBH)	EAT (DEG F)	LAT (DEG F)	EWT / LWT (DEG F)	FLOW (GPM)	WPD (FT)	ROWS	CONTROL VALVE	ELEC (V/PH)	МСА	FLA	MFS	REMARK
FCU-1	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-2	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-3	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-4	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-5	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-6	IEC	CXB06	550	Н	-	-	1/12	13.1	11.1	75 / 63	56 / 55	43 / 58	2	2.5	4	2-WAY	9.9	70	87	130 / 110	1.0	1.0	1	2-WAY	115/1	-	1.58	-	1, 2, 3, 4, 5
FCU-7	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-8	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-9	IEC	FXA12	975	H	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-10	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	I	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-11	IEC	FXA12	975	н		-	(0) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	2.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-11 FCU-12	IEC	FXA12 FXA12	975	Н	-	-	(2) 1/6 (2) 1/6	22.0	19.0	75/63	56 / 55	43 / 58	3.0	1.6	4	2-WA1 2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WA1 2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-12	IEC	FXA12	975	Н	-		(2) 1/6	22.0	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WA1 2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAT 2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-14	IEC	FXA12	975	Н	-	-	(2) 1/6	22.0	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WA1 2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAT 2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-15	IEC	CPY04	200	1	-	0.15	1/12	6.2	4.7	75 / 63	53 / 52	43 / 58	1	4.9	4	2-WAT 2-WAY	5.3	70	95	130 / 110	1.0	0.9	1	2-WAT 2-WAT	115/1	-	1.58	-	1, 2, 3, 4, 5
FCU-16	IEC	CPY08	300	L 		0.15	1/6	7.7	6.3	75 / 63	54 / 54	43 / 58	1	1.3	4	2-WAT	7.7	70	95	130 / 110	1.0	1.2	1	2-WAT 2-WAT	115/1	-	2.5	-	1, 2, 3, 4, 5,
FCU-17	IEC	CPY12	800	н		0.40	(2) 1/6	17.3	15.1	75 / 63	56 / 55	43 / 58	2.5	1.0	4	2-WAY	16.6	70	90	130 / 110	2.0	3.9	1	2-WAY	115/1	5.6	5	15	1, 2, 3, 4, 5,
FCU-18	IEC	HPY20	950	Н	-	0.60	1/2	30.6	23.8	75 / 63	52 / 52	43 / 58	4	2	6	2-WAY	36.1	70	105	130 / 110	4.0	7.6	2	2-WAY	115/1	13.5	12	15	1, 2, 3, 4, 5,
FCU-19	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-20	IEC	FXA12	975	H	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
										,	,	,								,					,				
FCU-21	IEC	FXA12	975	н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-22	IEC	FXA12	975	н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-23	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-24	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-25	IEC	CPY04	200	L		0.15	1/12	6.2	4.7	75 / 63	53 / 52	43 / 58	1	4.9	4	2-WAY	5.3	70	95	130 / 110	1.0	0.9	1	2-WAY	115/1	-	1.58	-	1, 2, 3, 4, 5,
FCU-26	IEC	CXB06	550	н	-	-	1/12	13.1	11.1	75 / 63	56 / 55	43 / 58	2	2.5	4	2-WAY	9.9	70	87	130 / 110	1.0	1.0	1	2-WAY	115/1	-	1.58	-	1, 2, 3, 4, 5
FCU-27	IEC	CPY04	200	L		0.15	1/12	6.2	4.7	75 / 63	53 / 52	43 / 58	1	4.9	4	2-WAY	5.3	70	95	130 / 110	1.0	0.9	1	2-WAY	115/1	-	1.58	-	1, 2, 3, 4, 5,
FCU-28	IEC	CPY08	300	L		0.15	1/6	7.7	6.3	75 / 63	54 / 54	43 / 58	1	1.3	4	2-WAY	7.7	70	95	130 / 110	1.0	1.2	1	2-WAY	115/1	-	2.5	-	1, 2, 3, 4, 5,
FCU-29	IEC	CPY08	400	М	-	0.30	1/6	10.9	8.9	75 / 63	55 / 55	43 / 58	1.5	2.2	4	2-WAY	9.2	70	90	130 / 110	1.0	1.1	1	2-WAY	115/1	-	2.5	-	1, 2, 3, 4, 5,
FCU-30	IEC	CXB10	600	М	-	-	(2) 1/12	13.9	12.2	75 / 63	56 / 55	43 / 58	2	0.8	4	2-WAY	12.5	70	105	130 / 110	1.0	1.6	1	2-WAY	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
FCU-31	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5,
FCU-32	IEC	FXA12	975	Н	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5,
FCU-33	IEC	CPY10	450	Н	-	0.40			9.6	75 / 63	56 / 55	43 / 58	1.5	0.4	4	2-WAY	11.6	70	93	130 / 110	1.5	2.0	1	2-WAY	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
FCU-34	IEC	FXA10	900	Н	-	-	(2) 1/12		18.2	75 / 63	56 / 55	43 / 58	3	1.4	4	2-WAY	18.1	70	88	130 / 110	2.0	4.6	1	2-WAY	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
FCU-35	IEC	FXA10	900	Н	-	-	(2) 1/12	21	18.2	75 / 63	56 / 55	43 / 58	3	1.4	4	2-WAY	18.1	70	88	130 / 110	2.0	4.6	1	2-WAY	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
FCU-36	IEC	HPY20	950	Н	-	0.60	1/2	30.6	23.8	75 / 63	52 / 52	43 / 58	4	2	6	2-WAY	36.1	70	105	130 / 110	4.0	7.6	2	2-WAY	115/1	13.5	12	15	1, 2, 3, 4, 5,
FCU-37	IEC	HPY20	950	н	-	0.60	1/2	30.6	23.8	75 / 63	52 / 52	43 / 58	4	2	6	2-WAY	36.1	70	105	130 / 110	4.0	7.6	2	2-WAY	115/1	13.5	12	15	1, 2, 3, 4, 5,
FCU-38	IEC	CPY12	800	н		0.40	(2) 1/6	17.3	15.1	75 / 63	56 / 55	43 / 58	2.5	1	4	2-WAY	16.6	70	90	130 / 110	2.0	3.9	1	2-WAY	115/1	5.6	5	15	1, 2, 3, 4, 5,
FCU-39	IEC	FXA12	975	H	-	-	(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5,
FCU-40	IEC	CPY08	400	М	-	0.30	1/6	10.9	8.9	75 / 63	55 / 55	43 / 58	1.5	2.2	4	2-WAY	9.2	70	90	130 / 110	1.0	1.1	1	2-WAY	115/1	-	2.5	-	1, 2, 3, 4, 5,
ECIL 41	IEC	EVA10	075				(0) 1/6	22.6	10.6	75 / 60	E8 / EE	40 / 59	2.0	1.6	4	0.14/4/	10.6	70		100 / 110		51		0.14/41/	445/4	5.0	5.0	15	10045
FCU-41 FCU-42	IEC IEC	FXA12 FXA12	975 975	Н	-	-	(2) 1/6	22.6 22.6	19.6 19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-42 FCU-43	IEC	FXA12 FXA12			-	-	(2) 1/6		-	75 / 63	56 / 55	43 / 58	3.0	1.6	-	2-WAY	19.6	70	88	130 / 110	2.0	5.1		2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-43 FCU-44	IEC	CXB06	975 550	H H	-		(2) 1/6	22.6	19.6	75 / 63	56 / 55	43 / 58	3.0	1.6	4	2-WAY	19.6	70	88 87	130 / 110	2.0	5.1	1	2-WAY	115/1	5.6	5.0	15	1, 2, 3, 4, 5
FCU-44 FCU-45	IEC	CXB06	550	H	-	-	1/12	13.1 13.1	11.1	75 / 63 75 / 63	56 / 55 56 / 55	43 / 58 43 / 58	2	2.5 2.5	4	2-WAY 2-WAY	9.9 9.9	70 70	87	130 / 110	1.0	1.0	1	2-WAY 2-WAY	115/1 115/1	-	1.58 1.58	-	1, 2, 3, 4, 5, 1, 2, 3, 4, 5,
FCU-46	IEC	CPY04	200		-	0.15	1/12	6.2	4.7	75 / 63	53 / 52	43 / 58	1	4.9	4	2-WA1 2-WAY	5.3	70	95	130 / 110	1.0	0.9	1	2-WAT 2-WAY	115/1	-	1.58	-	1, 2, 3, 4, 5,
FCU-47	IEC	CXB10	600	M	-	-	(2) 1/12	13.9	12.2	75 / 63	56 / 55	43 / 58	2	0.8	4	2-WAT 2-WAY	12.5	70	105	130 / 110	1.0	1.6	1	2-WAT 2-WAT	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
FCU-48	IEC	CXB10	600	M	-	-	(2) 1/12		12.2	75 / 63	56 / 55	43 / 58	2	0.8	4	2-WAT 2-WAT	12.5	70	105	130 / 110	1.0	1.6	1	2-WAT 2-WAT	115/1	3.6	3.16	15	1, 2, 3, 4, 5,
		0,010	500			1				,		,	-	2.0	† .							1.0				5.0			., _, 0, 1, 0,
L		1		1	-	1	1	1	1	1	1	1			1	1	1	L	1	1		1	1	1	I	1	1	1	

1. PROVIDE AND INSTALL WITH ELECTRONICALLY COMMUTATED MOTOR WITH 0-10VDC INPUT FOR EXTERNAL SPEED CONTROL SIGNAL. 2. PROVIDE AND INSTALL WITH STAINLESS STEEL INSULATED CONDENSATE PAN WITH OVERFLOW SWITCH WIRED TO SHUT DOWN FAN. 3. PROVIDE AND INSTALL WITH 1/2" THICK PREMIUM IAQ FIBERGLASS INSULATION. 4. PROVIDE AND INSTALL WITH FACTORY WIRED ELECTRICAL DISCONNECT SWITCH. 5. PROVIDE AND INSTALL WITH 0.025" COIL TUBE THICKNESS.

6. PROVIDE AND INSTALL WITH 14 GA CABINET. 7. PROVIDE AND INSTALL WITH NEOPRENE VIBRATION HANGERS. 8. PROVIDE AND INSTALL WITH CONDENSATE PUMP.

NOTES: 1. PROVIDE AND INSTALL ALL FAN COIL UNITS WITH 1" THICK MERV 8 PLEATED FILTER AND (2) SPARES. 2. PROVIDE AND INSTALL ALL FAN COIL UNITS WITH HOT WATER COILS IN REHEAT POSITION DOWNSTREAM OF CHILLED WATER COILS.

 4
 5
 6
 7
 8
 9
 10
 11
 12

TAG

12	13	14	15	16	17	18

HEAT	RECOVERY	UNIT	SCHEDULE	

	EXHAUST AIR							OUTSIDE	VENTIL	ATION AIF	7		WHEEL							
	MFR.	MODEL	SERVICE	AIRLFOW (CFM)	APD (IN W.C.)	MODE	EXHAUST EDB/EWB (DEG F)	AIRLFOW (CFM)	APD (IN W.C.)	MODE	OA EDB/EWB (DEG F)	WHEEL EXIT LDB/LWB (DEG F)	TOTAL HEAT (MBH)	SENS HEAT (MBH)	SENS EFF %	LATENT EFF %	WHEEL MOTOR HP	DRIVE	ELEC (V/PH)	REMA
1	CARRIER	ERC74122C	DOAS	15000	1.1	SUMMER	75 / 63	15000	1.1	SUMMER	90 / 74	81 / 68	331	138	58.5	54.6	0.33	BELT	460/3	1, 2
				15000	1.1	WINTER	70 / 62	15000	1.1	WINTER	-10 / -10	44 / 42	936	556	43.2	54.7				

1. ENTHALPY WHEEL SHALL HAVE VARIABLE SPEED MOTOR AND BYPASS DAMPERS WITH ACTUAORS. FROST CONTROL OF WHEEL SHALL BE CONTROLLED VIA PACKAGED CONTROLS. 2. PROVIDE WITH 2" MERV 11 PLEATED FILTER MEDIA ON EXHAUST AIR STREAM BEFORE WHEEL AND ON OUTSIDE AIR STREAM BEFORE WHEEL. 3. PROVIDE WITH 2-POSITION MOTORIZED ULTRA LOW LEAK DAMPER AT ENTRANCE/EXIT TO OUTSIDE WITH WEATHER HOODS. DAMPERS SHALL CLOSE WHEN UNIT IS OFF.

			PLAT) FRA			хсн	ANG	ER S	СНІ	EDUL	E	\rightarrow	$\overline{}$	۱
								FLUID 1				FLUID 2		-		$\mathbf{)}$
TAG	MFR.	MODEL	LMTD (DEG F)	EFF SURF AREA (SF)	PLATES	SIZE WxH (IN)	CAPACITY (MBH)	FLUID TYPE	FLOW (GPM)	EWT/LWT (DEG F)	PD (PSI)	FLUID TYPE	FLOW (GPM)	EWT/LWT (DEQ F)	PD (PSI)	- FREM
HX-1	BELL & GOSSETT	GPX AP31	9.56	127.88	38	17.625 x 58.75	891	WATER	90	130 / 110	7.57	30 % PG	90	120 100	8.11	1 , 2
																\nearrow

3. GASKETS SHALL BE NITRILE HT 4. PLATES SHALL BE FIELD INSULATED WITH 1" AEROCELL EPDM.

14

15

13

						LOU	/ER S	CHE	DULE								
1	TAG	Mer.	SERVICE	INTAKE / BELIEF	MQDEL	FACE SIZE	FREE AREA	AIRFLOW	FACE VELOCITY (FPM)	AIR PRESSU			ss	ELNIS	ян	R	REMA
\rightarrow	L-1	GREENHEGK	MEZZANINE	INTAKE	EHH-601	84x108		15000	470	0.05	$\overline{\vee}$		$\overline{\mathbf{V}}$	2:0 MIL 708	KYNAR		1,2
	L-2	GREENHECK	MEZZANINE	INTÁKE	EHH-601	84x108	32.0	15000	470	0.05	'	6	•	2.0 MIL 70%	6 KYNAR		1, 2
<u> </u>	L-3	GREENHECK	REFRIGERANT	INTAKE	EHH-601	72x108	27.2	13600	500	0.05		6		2.0 MIL 70%	6 KYNAR		1, 2
	2. COLO	DE AND INSTALL R SHALL BE SEL	WITH CHANNEL I ECTED BY ARCHIT WITH ALUMINUM	ECT.							٨						

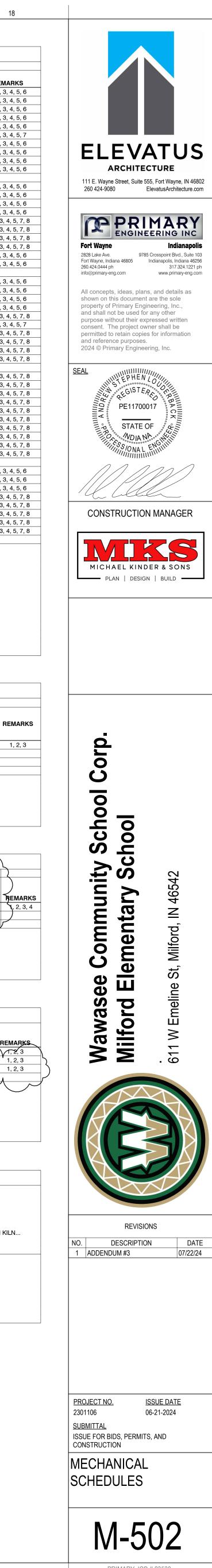
NOTE: PRIOR TO ORDERING ANY LOUVER, CONTRACTOR SHALL FIELD VERIFY ANY EXISTING OPENINGS THAT LOUVERS MUST BE INSTALLED IN.

GENERAL MECHANICAL EQUIPMENT SCHEDULE

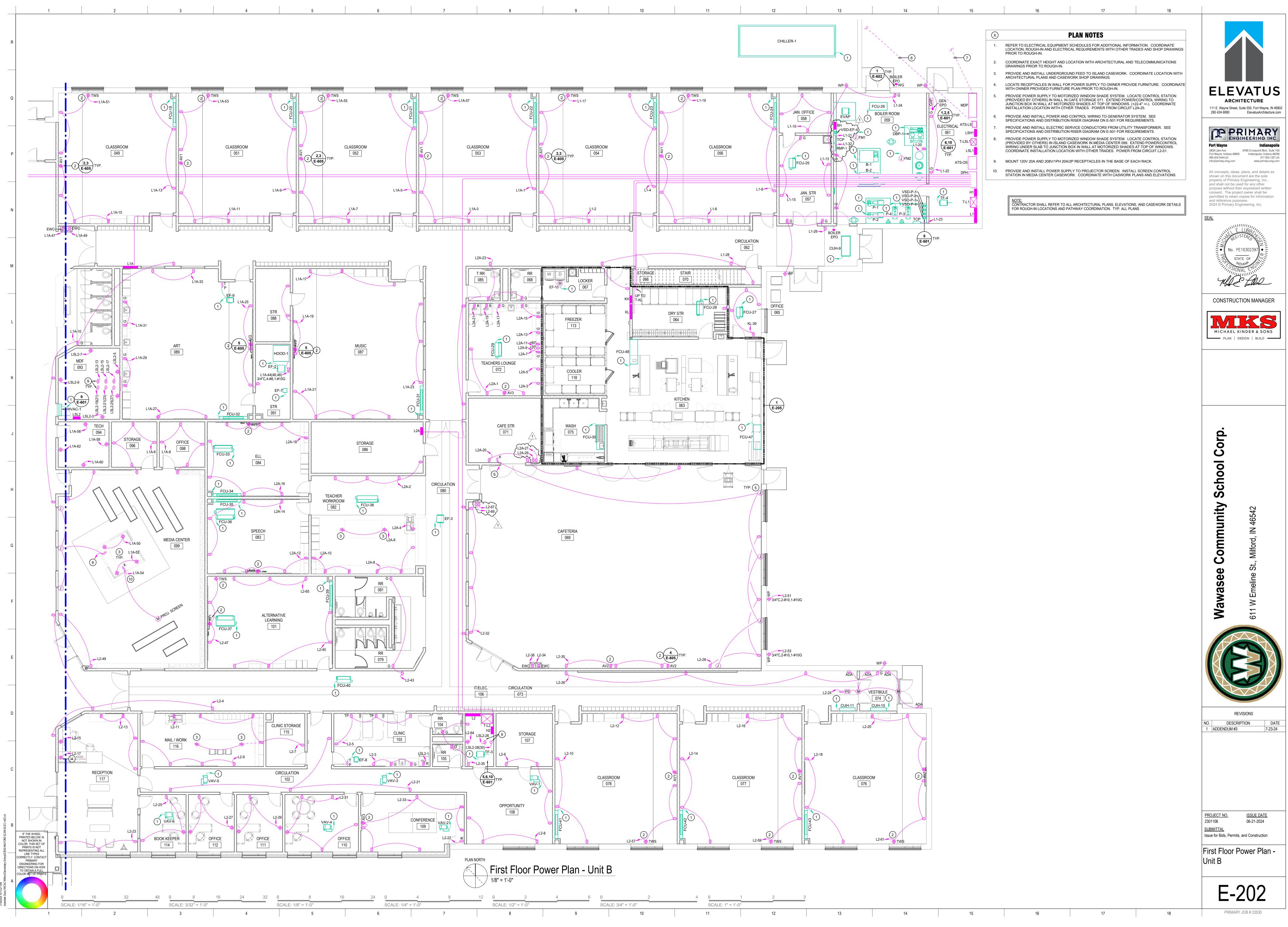
TAG:	HOOD-1
TYPE:	OVERHEAD CANOPY HOOD
MFR:	KEES
MODEL:	OVERHEAD INDUSTRIAL HOOD
PERFORMANCE:	1,000 CFM, STYLE "C", 48" LONG X 48" WIDE X 12" TALL, CENTERED 12X12 DUCT OUTLET.
REMARKS:	1. CONTRACTOR SHALL VERIFY KILN DIMENSIONS PRIOR TO ORDERING. HOOD LENTGTH AND WIDTH SHALL BE MIN. 6" GREATER THAN KILN.
	2. ALL WELDED 18 GA. STAINLESS STEEL CONSTRUCTION WITH EASED EDGES.
TAG:	CT-1
TYPE:	CONDENSATE NEUTRALIZATION TANK
MFR:	TOWN & COUNTRY PLASTICS
MODEL:	NT-1
PERFORMANCE:	2 GALLON HPDE DILUTION TANK
REMARKS:	1. PROVIDE AND INSTALL WITH POLYPROPYLENE COVER.
	2. PROVIDE AND INSTALL WITH 1-1/2" INLET AND OUTLET CONNECTIONS.

16

17



PRIMARY JOB # 23530





(>	\mathbf{O}	PLAI	N NOTES	
1			VE CEILING FOR POWER SUPPLY ⁻ OR HARDWARE SUPPLIER.	TO DOOR ACCESS
2			IER WORK STATION. CONTRACTO ROUGH-IN. REFER TO DETAIL FOR	
3			WALL MOUNTED MONITOR. COORI H-IN. REFER TO DETAIL FOR ADDIT	
4			JNTED AT +4" ABOVE FINISHED FL PAINT WITH FIRE RESISTANCE PA	
5	5. TELECOMMUNICA	TION GROUND BAR TO BE	EMOUNTED AT +16" ABOVE FINISH	IED FLOOR.
6			CEILING MOUNTED PROJECTOR. C -IN. REFER TO DETAIL FOR ADDITI	
7	7. MOUNT SPEAKER(SUPPORTS. TYPIC		E. COORDINATE WITH GYMNASIUN	I EQUIPMENT
8	SIGNAL CABLE BY		I ONE (1) 3/4" CONDUIT UP STRUC R. CONTRACTOR SHALL COORDIN DARD INSTALLER.	
9	PROVIDE AND INS	TALL FIRE ALARM SYSTE	M ANNUNCIATOR IN WALL. COORE	DINATE WITH ALL TR
1(AND 32" FROM DO	OR WALL FOR DOOR HOL	OVE CEILING AND JUNCTION BOXI D OPEN/LOCK DOWN SYSTEM. BOX /ERIFY LOCATIONS WITH SYSTEM	OXES SHALL BE SIN
1	ABOVE FLOOR ALC	ONG EAST WALL		DOM 035. STUB UP
	2. LOCATE MIC / AUX	(/3.5 AUDIO (1 EACH) JAC	K IN PLATE IN WALL.	
<u>.</u>				
ſ		SLEEVE	SCHEDULE	
ŀ	TAG	FIRE ALARM	TELECOMMUNICATIONS	REMARKS

3/4" 3/4"

3/4"

3/4"

16

17

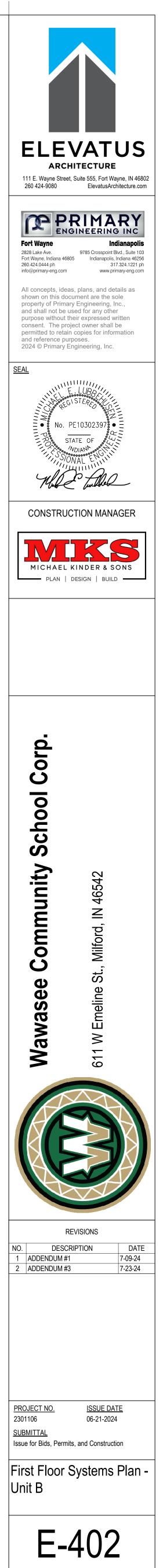
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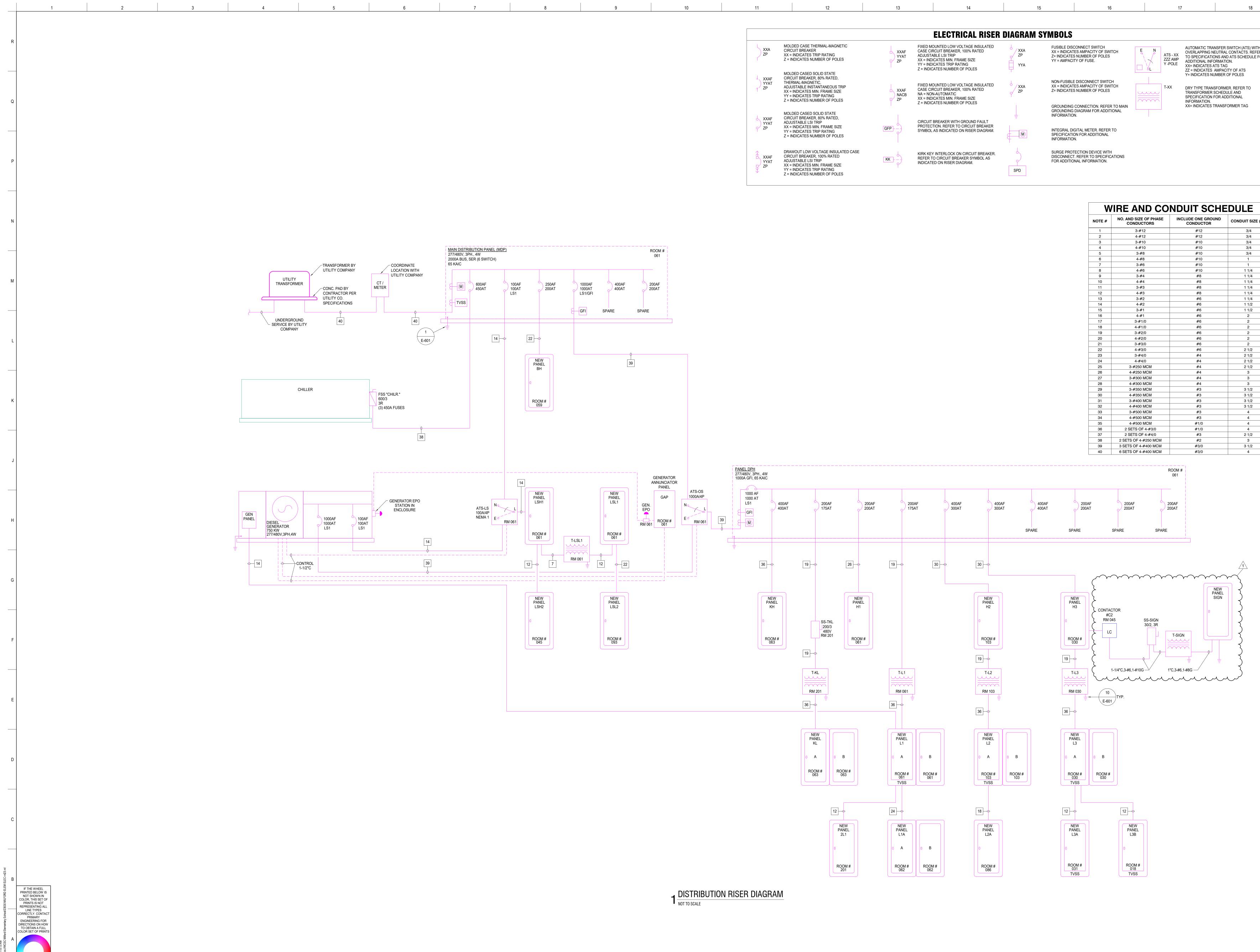
REMARKS:

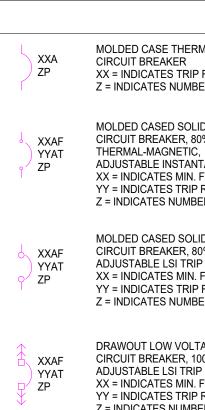
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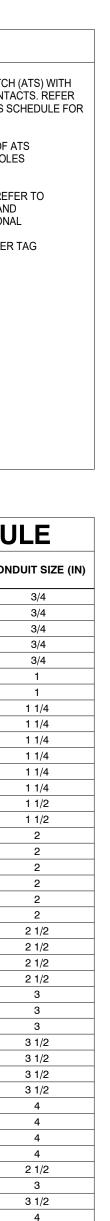


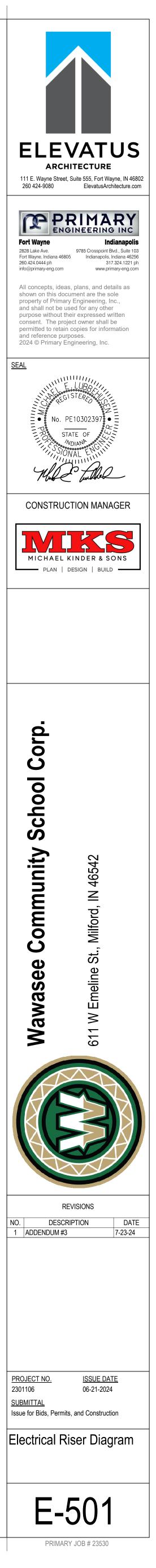


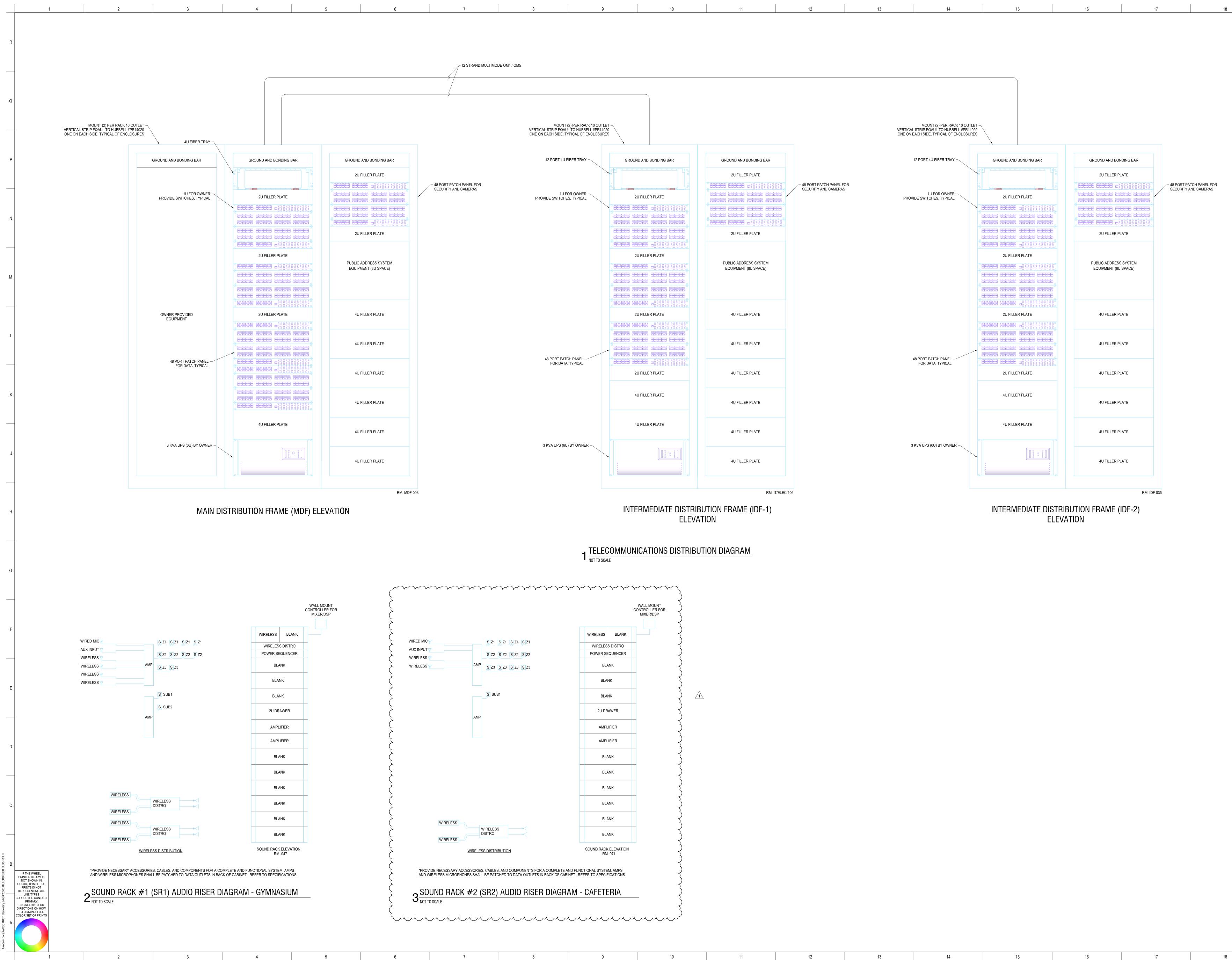


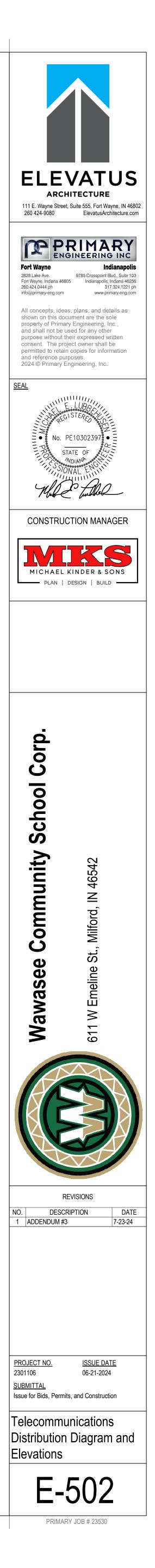
12	13	14	15	16		17	18
		ELECTRICAL RISER	DIAGRAM S	YMBOLS			
RMAL-MAGNETIC P RATING BER OF POLES	XXAF YYAT ZP	FIXED MOUNTED LOW VOLTAGE INSULATED CASE CIRCUIT BREAKER, 100% RATED ADJUSTABLE LSI TRIP XX = INDICATES MIN. FRAME SIZE YY = INDICATES TRIP RATING Z = INDICATES NUMBER OF POLES	XXA ZP YYA	FUSIBLE DISCONNECT SWITCH XX = INDICATES AMPACITY OF SWITCH Z= INDICATES NUMBER OF POLES YY = AMPACITY OF FUSE.	Z	ATS - XX OV ZZZ AMP AD (-POLE XX	JTOMATIC TRANSFER SWITCH (ATS) WIT /ERLAPPING NEUTRAL CONTACTS. REFE) SPECIFICATIONS AND ATS SCHEDULE I DITIONAL INFORMATION. (= INDICATES AMPACITY OF ATS
LID STATE 80% RATED, C, NTANEOUS TRIP I. FRAME SIZE P RATING BER OF POLES	XXAF NACB ZP	FIXED MOUNTED LOW VOLTAGE INSULATED CASE CIRCUIT BREAKER, 100% RATED NA = NON-AUTOMATIC XX = INDICATES MIN. FRAME SIZE Z = INDICATES NUMBER OF POLES	XXA ZP	NON-FUSIBLE DISCONNECT SWITCH XX = INDICATES AMPACITY OF SWITCH Z= INDICATES NUMBER OF POLES		T-XX DR TR SP INI	INDICATES NUMBER OF POLES RY TYPE TRANSFORMER. REFER TO RANSFORMER SCHEDULE AND PECIFICATION FOR ADDITIONAL FORMATION.
LID STATE 80% RATED, IP I. FRAME SIZE P RATING BER OF POLES		CIRCUIT BREAKER WITH GROUND FAULT PROTECTION. REFER TO CIRCUIT BREAKER SYMBOL AS INDICATED ON RISER DIAGRAM.		GROUNDING CONNECTION. REFER TO MAIN GROUNDING DIAGRAM FOR ADDITIONAL INFORMATION. INTEGRAL DIGITAL METER. REFER TO SPECIFICATION FOR ADDITIONAL		XX	(= INDICATES TRANSFORMER TAG

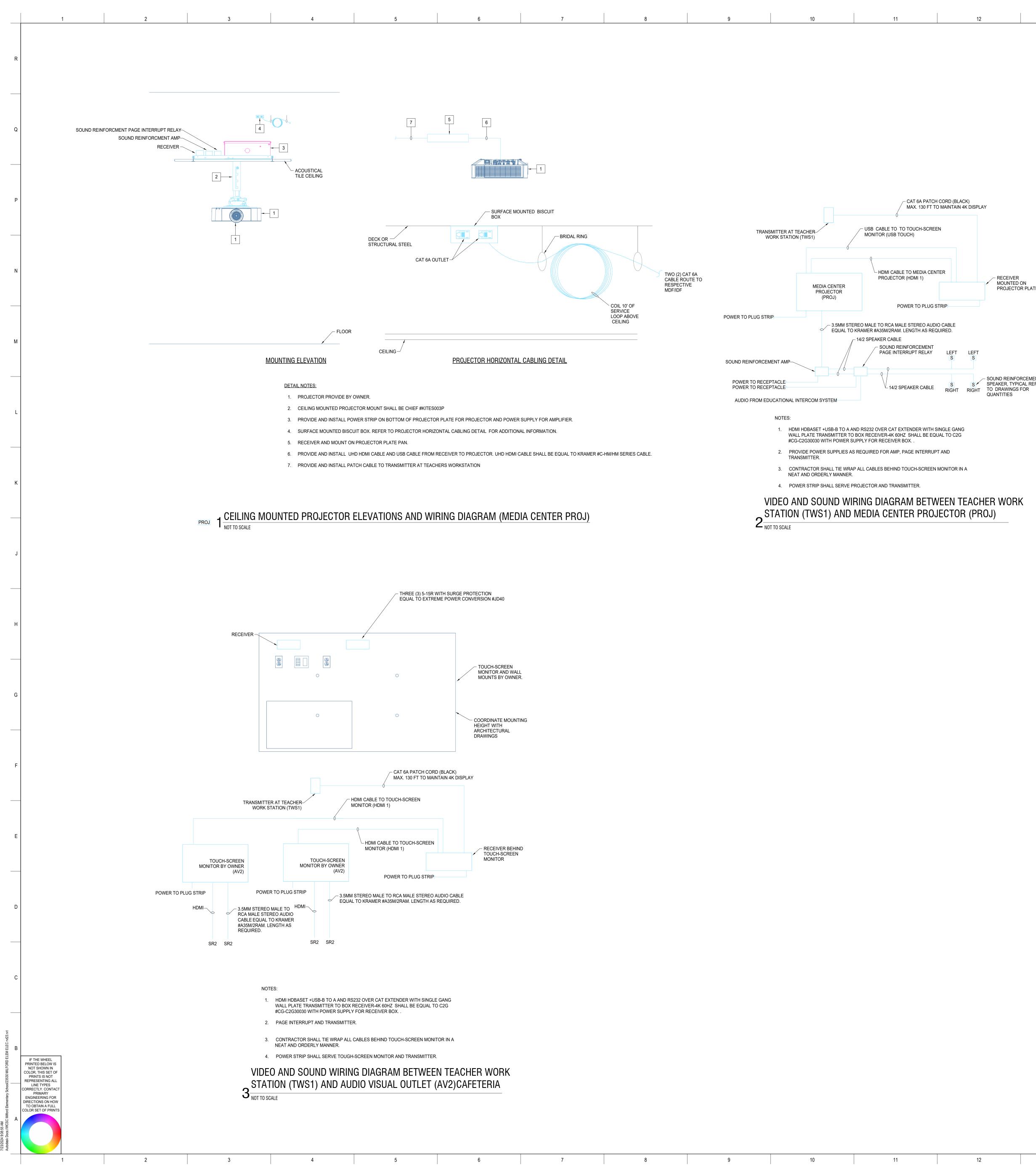
NOTE #	NO. AND SIZE OF PHASE CONDUCTORS	INCLUDE ONE GROUND CONDUCTOR	CONDUIT S
1	3-#12	#12	3/4
2	4-#12	#12	3/4
3	3-#10	#10	3/4
4	4-#10	#10	3/4
5	3-#8	#10	3/4
6	4-#8	#10	1
7	3-#6	#10	1
8	4-#6	#10	1 1/4
9	3-#4	#8	1 1/4
10	4-#4	#8	1 1/4
11	3-#3	#8	1 1/4
12	4-#3	#8	1 1/4
13	3-#2	#6	1 1/4
14	4-#2	#6	1 1/2
15	3-#1	#6	1 1/2
16	4-#1	#6	2
17	3-#1/0	#6	2
18	4-#1/0	#6	2
19	3-#2/0	#6	2
20	4-#2/0	#6	2
21	3-#3/0	#6	2
22	4-#3/0	#6	2 1/2
23	3-#4/0	#4	2 1/2
24	4-#4/0	#4	2 1/2
25	3-#250 MCM	#4	2 1/2
26	4-#250 MCM	#4	3
27	3-#300 MCM	#4	3
28	4-#300 MCM	#4	3
29	3-#350 MCM	#3	3 1/2
30	4-#350 MCM	#3	3 1/2
31	3-#400 MCM	#3	3 1/2
32	4-#400 MCM	#3	3 1/2
33	3-#500 MCM	#3	4
34	4-#500 MCM	#3	4
35	4-#500 MCM	#1/0	4
36	2 SETS OF 4-#3/0	#1/0	4
37	2 SETS OF 4-#4/0	#3	2 1/2
38	2 SETS OF 4-#250 MCM	#2	3
39	3 SETS OF 4-#400 MCM	#3/0	3 1/2
40	6 SETS OF 4-#400 MCM	#3/0	4







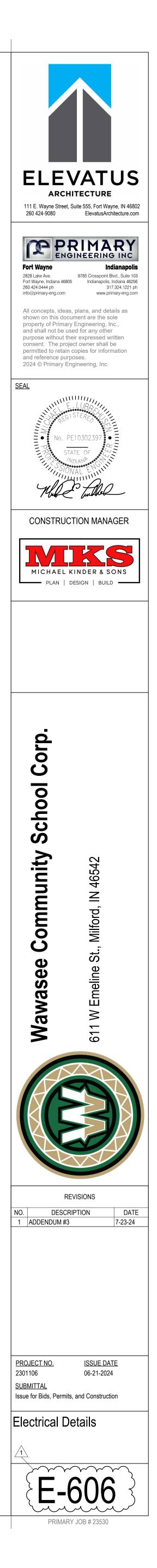




- SOUND REINFORCEMENT

S SPEAKER, TYPICAL REFER

- RECEIVER MOUNTED ON PROJECTOR PLATE



1 2 3 4	4 5 6	7 8 9	9 10 11	12	13 14 15
R					EQUIPMENT SCHEDU
	CIRCUIT INFORMAT			EQUIPMENT DESIGNATION EQUIPMENT LOCATION EQUIPMENT LOCATION VOLTAGE/PHASE	CIRCUIT INFORMATION DISCONNECT DISCONNECT DISCONNECT CONDUIT AND CONDUCTOR SIZE BRANCH CIRCUIT DESIGNATION A A A A A A A A A A A A A A A A A A A
	P-1 059 CH WATER 20 HP 480V/3PH 1"C, 4-#6, 1-#10 GROUND P-2 059 CH WATER 20 HP 480V/3PH 1"C, 4-#6, 1-#10 GROUND P-3 059 HOT WATER 10 HP 480V/3PH 3/4"C, 4-#10, 1-#10 GROUND P-4 059 HOT WATER 10 HP 480V/3PH 3/4"C, 4-#10, 1-#10 GROUND P-5 MEZZ 201 DOAS-1 5 HP 480V/3PH 3/4"C, 4-#12, 1-#12 GROUND P-6 MEZZ 201 DOAS-1 5 HP 480V/3PH 3/4"C, 4-#12, 1-#12 GROUND		C 1 C 1 C 1 C 1 C 1 C 1 C 1	CHLR-1 SITE 424 MCA 480V/34 CHLR-1 SITE 424 MCA 480V/34 AHU-1 201 - OFFICE 5 HP, 7.6 FLA 480V/34 AHU-2 201 - CAFETERIA 15 HP, 21 FLA 480V/34 AHU-3 ROOF - GYM 15 HP, 21 FLA 480V/34 DOAS-1.1 201 - SUPPLY 25 HP, 34 FLA 480V/34 DOAS-1.2 201 - VENTILATION 20 HP, 27 FLA 480V/34	PH 3/4"C, 4-#10, 1-#10 GROUND H1-14(16,18) EC NF 1 30/3 PH 1"C, 4-#8, 1-#10 GROUND H1-38(40,42) EC NF 1 30/3 PH 1"C, 4-#8, 1-#10 GROUND H1-38(40,42) EC NF 1 30/3 PH 1"C, 4-#8, 1-#10 GROUND H3-32(34,36) EC NF 3R 30/3 PH 1 1/4"C, 4-#4, 1-#8 GROUND H1-31(33,35) EC NF 1 60/3
P	B-1 BOILER ROOM 16 MCA 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND B-2 BOILER ROOM 16 MCA 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND GFS-1 MEZZANINE 201 3/4 HP 120V/1PH 3/4"C, 2-#10, 1-#10 GROUND DBP-1 BOILER ROOM 7 1/2 HP 480V/3PH 3/4"C, 4-#8, 1-#8 GROUND HWRP-1 BOILER ROOM 2/5 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	2L1-9 EC NF 1 30/1 X. H1-20(22,24) EC NF 1 30/3 X		CUH-1 VEST. 032 1.4 A 120V/11 CUH-2 CIRC. 037 1.4 A 120V/11 CUH-3 VEST. 041 1.4 A 120V/11 CUH-4 CIRC. 097 1.4 A 120V/11 CUH-5 VEST. 016 1.4 A 120V/11 CUH-6 CIRC. 025 1.4 A 120V/11 CUH-7 VEST. 001 2.2 A 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L3A-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-30 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-30 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-30 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3B-5 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3B-5 INT
N	Immediate	L1-20 EC NF 1 20/1 X Image: Constraint of the second sec		CUH-8 COMMONS 002 2.2 A 120V/11 CUH-9 CIRC. 062 1.4 A 120V/11 CUH-10 VEST. 074 1.4 A 120V/11 CUH-11 CIRC. 073 1.4 A 120V/11 FCU-1 1ST GRADE 033 5 FLA 120V/11 FCU-2 2ND GRADE 034 5 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L3B-20 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-16 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-50 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-50 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-50 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L3A-5 INT INT
м	TMV-2 BOILER ROOM 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND EF-1 UNIT A 1 HP 120V/1PH 3/4"C, 2-#10, 1-#10 GROUND EF-2 UNIT B 3/4 HP 120V/1PH 3/4"C, 2-#10, 1-#10 GROUND EF-3 UNIT B 3/4 HP 120V/1PH 3/4"C, 2-#10, 1-#10 GROUND EF-4 REFRIGERANT 7.5 HP 480V/3PH 3/4"C, 4-#12, 1-#12 GROUND EF-5 WAREWASH 1/2 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	2L1-13 EC NF 1 20/1 X Image: Constraint of the state	Image: state	FCU-3 2ND GRADE 036 5 FLA 120V/11 FCU-4 2ND GRADE 038 5 FLA 120V/11 FCU-5 SPEC. ED. 039 5 FLA 120V/11 FCU-6 RCS. STOR. 031 1.58 FLA 120V/11 FCU-7 1ST GRADE 029 5 FLA 120V/11 FCU-8 1ST GRADE 024 5 FLA 120V/11 FCU-9 PRE-K 019 5 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L3A-15 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-30 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3A-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3A-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3A-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3A-18 INT
	EF-6 KILN ROOM 1/2 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND EF-7 KILN 150 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND EF-8 CLINIC 172 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND EF-9 ART ROOM 285 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND EF-10 DRYER BOOSTER 70 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-1 AHU-3 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	L1A-20 EC NF 1 20/1 X Image: Constraint of the state	Image: state of the state	FCU-10 PRE-K 013 5 FLA 120V/11 FCU-11 KG. 011 5 FLA 120V/11 FCU-12 KG. 007 5 FLA 120V/11 FCU-13 KG. 004 5 FLA 120V/11 FCU-14 COLLAB. 003 5 FLA 120V/11 FCU-15 PE OFFICE 048 1.58 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L3B-13 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3B-6 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3B-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3B-12 INT
	RF-2 AHU-3 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-3 AHU-3 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-4 AHU-2 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-5 AHU-2 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-6 AHU-2 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-7 AHU-1 RELIEF 1 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND RF-8 AHU-1 RELIEF 1/2 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	L3-36 INT INT <td< td=""><td>Image: state of the state o</td><td>FCU-16 TR. WK. RM. 022 2.5 FLA 120V/11 FCU-17 GYM STR. 047 5 FLA 120V/11 FCU-18 CIRC. 097 12 FLA 120V/11 FCU-19 3RD GRADE 049 5 FLA 120V/11 FCU-20 3RD GRADE 051 5 FLA 120V/11 FCU-21 3RD GRADE 052 5 FLA 120V/11 FCU-21 3RD GRADE 052 5 FLA 120V/11</td><td>PH 3/4"C, 2-#12, 1-#12 GROUND L3-7 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A- INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-14 INT</td></td<>	Image: state of the state o	FCU-16 TR. WK. RM. 022 2.5 FLA 120V/11 FCU-17 GYM STR. 047 5 FLA 120V/11 FCU-18 CIRC. 097 12 FLA 120V/11 FCU-19 3RD GRADE 049 5 FLA 120V/11 FCU-20 3RD GRADE 051 5 FLA 120V/11 FCU-21 3RD GRADE 052 5 FLA 120V/11 FCU-21 3RD GRADE 052 5 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L3-7 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A- INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-14 INT
К	TF-1 IDF 035 1/4 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND TF-2 ELECTRICAL 030 1/4 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND TF-3 IT / ELEC 106 1/4 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND TF-3 IT / ELEC 106 1/4 HP 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND DF-1 RM 001 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND DF-2 RM 043 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	L3-13 INT INT <th< td=""><td>Image: state of the state o</td><td>FCU-22 4TH GRADE 053 5 FLA 120V/11 FCU-23 4TH GRADE 054 5 FLA 120V/11 FCU-24 4TH GRADE 056 5 FLA 120V/11 FCU-25 JAN. STR. 057 1.58 FLA 120V/11 FCU-26 BOILER RM. 059 1.58 FLA 120V/11 FCU-27 OFFICE 065 1.58 FLA 120V/11 FCU-28 DRY STR. 064 2.5 FLA 120V/11 FCU-29 TR LOUNGE 072 2.5 FLA 120V/11</td><td>PH 3/4"C, 2-#12, 1-#12 GROUND L1-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-14 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-14 INT</td></th<>	Image: state of the state o	FCU-22 4TH GRADE 053 5 FLA 120V/11 FCU-23 4TH GRADE 054 5 FLA 120V/11 FCU-24 4TH GRADE 056 5 FLA 120V/11 FCU-25 JAN. STR. 057 1.58 FLA 120V/11 FCU-26 BOILER RM. 059 1.58 FLA 120V/11 FCU-27 OFFICE 065 1.58 FLA 120V/11 FCU-28 DRY STR. 064 2.5 FLA 120V/11 FCU-29 TR LOUNGE 072 2.5 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L1-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-12 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-18 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-14 INT PH 3/4"C, 2-#12, 1-#12 GROUND L1-14 INT
J 	DF-3 RM 043 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND DF-4 RM 043 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND DF-5 RM 043 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND DF-5 RM 043 16 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND FM-1 BOILER RM 059 50 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND FM-2 BOILER RM 059 50 W 120V/1PH 3/4"C, 2-#12, 1-#12 GROUND	L3-30 EC NF 1 20/1 X Image: Constraint of the state o	Image: state of the state	FCU-30 KITCHEN 063 3.16 FLA 120V/11 FCU-31 MUSIC 087 5 FLA 120V/11 FCU-32 ART 089 5 FLA 120V/11 FCU-33 ELL 084 3.16 FLA 120V/11 FCU-34 ELL 084 3.16 FLA 120V/11 FCU-35 SPEECH 083 3.16 FLA 120V/11 FCU-36 SPEECH 083 12 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L1A-35 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-35 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L1A-35 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2A-22 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2A-22 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2A-22 INT INT
н	Image: state	Image: state of the state o	Image: state	FCU-37 ALT. LEARN 101 12 FLA 120V/11 FCU-38 TR. WR. 082 5 FLA 120V/11 FCU-39 ALT. LEARN 101 5 FLA 120V/11 FCU-40 CIRC. 073 2.5 FLA 120V/11 FCU-41 5TH GRADE 078 5 FLA 120V/11 FCU-42 5TH GRADE 077 5 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND L2-44 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2A-26 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-46 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-46 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-46 INT INT PH 3/4"C, 2-#12, 1-#12 GROUND L2-48 INT INT
G	Image: Sector	Image: state stat	Image: state stat	FCU-43 5TH GRADE 076 5 FLA 120V/11 FCU-44 MEZZ. 201 1.58 FLA 120V/11 FCU-45 MEZZ. 201 1.58 FLA 120V/11 FCU-46 SENSORY 026 1.58 FLA 120V/11 FCU-47 KITCHEN 3.16 FLA 120V/11 FCU-48 KITCHEN 3.16 FLA 120V/11	PH 3/4"C, 2-#12, 1-#12 GROUND 2L1-1 INT PH 3/4"C, 2-#12, 1-#12 GROUND 2L1-3 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3-43 INT PH 3/4"C, 2-#12, 1-#12 GROUND L3-43 INT PH 3/4"C, 2-#12, 1-#12 GROUND KL-47 INT PH 3/4"C, 2-#12, 1-#12 GROUND KL-47 INT
F	Image: state stat	Image: state stat	Image: state stat	VAV-1 OPPORTUNITY 108 50W 277V/11 VAV-2 CONFERENCE 109 50W 277V/11 VAV-3 CIRCULATION 102 50W 277V/11 VAV-4 OFFICE 110 50W 277V/11 VAV-5 CIRCULATION 102 50W 277V/11 VAV-6 OFFICE 114 50W 277V/11 VAV-6 OFFICE 114 50W 277V/11 HVAC-1 MDF 093 1 MCA 208V/11	PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1 PH 3/4"C, 2-#12, 1-#12 GROUND H2-2 EC NF 1 20/1
	Image: Sector	Image: state of the state	Image: state	ACCU-1 ROOF 11 MCA 208V/11	
E	Image: Sector	Image: series of the series	Image: Sector	Image: Sector of the sector	Image: state stat
	SCHEDULE ABBREVATIONS A AMPACITY HL HIGH/LOW SWITCH	MCA MIN CIRCUIT AMPACITY XA/YP X AMP CIRCUIT B		SCHEDULE ABBREVATIONS A AMPACITY HL	HIGH/LOW SWITCH MCA MIN CIRCUIT AMPACITY
С	ECELECTRICAL CONTRACTORHLOHIGH/LOW/OFF SWITCHEXEXISTING EQUIPMENTHOAHAND/OFF/AUTOFFUSEDHPHORSE POWERFLAFULL LOAD AMPSINTINTEGRAL WITH EQUIPMENTFVNRFULL VOLTAGE NON-REVERSINGLORLOCAL/OFF REMOTE SWITCHFVRFULL VOLTAGE REVERSINGMMOMENTARY ON/OFF SWITCHGGENERAL CONTRACTORMCMECHANICAL CONTRACTOR	MHLMOMENTARY HIGH/LOW SWITCHXAFSWITCH WITH X AMHLOMOMENTARY HIGH/LOW/OFF SWITCHNFNON-FUSEDOOWNER FURNISHED AND INSTALLEDRLARUNNING LOAD AMPSSON/OFF SWITCHWWATTS	AMP FUSE(S)	ECELECTRICAL CONTRACTORHLOEXEXISTING EQUIPMENTHOAFFUSEDHPFLAFULL LOAD AMPSINTFVNRFULL VOLTAGE NON-REVERSINGLORFVRFULL VOLTAGE REVERSINGMGGENERAL CONTRACTORMC	HIGH/LOW/OFF SWITCHMHLMOMENTARY HIGH/LOW SWITCHHAND/OFF/AUTOMHLOMOMENTARY HIGH/LOW/OFF SWITCHHORSE POWERNFNON-FUSEDINTEGRAL WITH EQUIPMENTOOWNER FURNISHED AND INSTALLEDLOCAL/OFF REMOTE SWITCHRLARUNNING LOAD AMPSMOMENTARY ON/OFF SWITCHSON/OFF SWITCHMECHANICAL CONTRACTORWWATTS
B IF THE WHEEL PRINTED BELOW IS NOT SHOWN IN COLOR, THIS SET OF PRINTS IS NOT REPRESENTING ALL LINE TYPES CORRECTLY. CONTACT PRIMARY ENGINEERING FOR DIRECTIONS ON HOW TO OBTAIN A FULL COLOR SET OF PRINTS	 REMARKS 1. PROVIDE AND INSTALL ALL MATERIALS AS INDICATED IN SCHEDULE AND SPECIFICATIONS TO 2. PROVIDE AND INSTALL LOCAL MANUAL MOTOR CONTROLLER-DISCONNECT SWITCH WITH TH 3. PROVIDE AND INSTALL 120V, 20A/1P RELAY CONTROLLED BY DRYER START/RUN CONTROL. 4. ALL CONDUCTORS TO CHILLER SHALL BE COPPER PER MANUFACTURER REQUIMENTS. 5. CONNECT CONDENSATE PUMP TO UNIT CIRCUIT. 6. WIRE THROUGH WALL CONTROL SWITCH IN ROOM SERVED. SEE POWER PLANS FOR LOCATI 7. PROVIDE AND INSTALL CEILING / STRUCTURE MOUNTED RECEPTACLE FOR PLUG IN OF EQUIF 8. PROVIDE AND INSTALL POWER TO JUNCTION BOX AT EQUIPMENT WITH POWER CIRCUIT FOR 	HERMAL OVERLOADS, PILOT LIGHT, AUX CONTACTS. SEE SPECIFICATIONS. TIONS. IIPMENT. COORDINATE LOCATIONS WITH MECHANICAL TRADESS.		 PROVIDE AND INSTALL LOCAL MANUAL MOTOR CONTR PROVIDE AND INSTALL 120V, 20A/1P RELAY CONTROLL ALL CONDUCTORS TO CHILLER SHALL BE COPPER PER CONNECT CONDENSATE PUMP TO UNIT CIRCUIT. WIRE THROUGH WALL CONTROL SWITCH IN ROOM SE PROVIDE AND INSTALL CEILING / STRUCTURE MOUNTED 	R MANUFACTURER REQUIMENTS.
A COLOR SET OF PRINTS WW 85:51:01 P2026112	4 5 6	7 8 9	9 10 11	12	13 14 15

	EQUI		ENT	SC	HE	DUL	_ E	1											1
CIRCUIT INFORMATIC	DN		DI	SCONN	ECT			FREQUEN	IABLE ICY/SPEED VFD/VSD)		SO	LID STA	те мото	OR STAR	ER			NUL	z
ONDUIT AND CONDUCTOR SIZE	BRANCH CIRCUIT DESIGNATION	PROVIDED BY	FUSED OR NON-FUSED	NEMA ENCLOSURE	DISCONNECT SWITCH SIZE	FUSE RATING	EQUIPMENT MOUNTED CONTROL PANEL	PROVIDED BY	INSTALLED BY	PROVIDED BY	NEMA SIZE	CONTROL	ТҮРЕ	DISCONNECT SWITCH SIZE	FUSE RATING	NEMA ENCLOSURE	REMARKS	EQUIPMENT DESIGNATION	EQUIPMENT LOCATION
1"C, 4-#6, 1-#10 GROUND	BH-1(3,5)	EC	NF	2 1		<u> </u>		MC	EC	<u> </u>	z			00	<u>L</u>	z	1	CHLR-1	SITE
1"C, 4-#6, 1-#10 GROUND 3/4"C, 4-#10, 1-#10 GROUND	BH-2(4,6) H1-26(28,30)	EC EC	NF NF	1				MC MC	EC EC								1	AHU-1	201 - OFFICE
3/4"C, 4-#10, 1-#10 GROUND 3/4"C, 4-#12, 1-#12 GROUND	H1-32(34,36) H1-19(21,23)	EC EC	NF	1				MC MC	EC EC								1	AHU-2 AHU-3	201 - CAFETERIA ROOF - GYM
3/4"C, 4-#12, 1-#12 GROUND	H1-25(27,29)	EC	NF	1				MC	EC								1	DOAS-1.1 DOAS-1.2	201 - SUPPLY 201 - VENTILATION
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L1-5 L1-7	EC EC	NF NF	1	20/1 20/1	X. X.											1	CUH-1	VEST. 032
3/4"C, 2-#10, 1-#10 GROUND	2L1-9	EC	NF	1	30/1	Х.											1	CUH-2 CUH-3	CIRC. 037 VEST. 041
3/4"C, 4-#8, 1-#8 GROUND	H1-20(22,24)	EC	NF	1	30/3	x											1	CUH-4 CUH-5	CIRC. 097 VEST. 016
3/4"C, 2-#12, 1-#12 GROUND	2L1-11	EC	NF	1	20/1	X											1	CUH-6 CUH-7	CIRC. 025
3/4"C, 2-#12, 1-#12 GROUND	L1-20	EC	NF	1	20/1	X											1	CUH-8 CUH-9	COMMONS 002 CIRC. 062
3/4"C, 2-#12, 1-#12 GROUND	2L1-20	EC	NF	1	20/1	X											1	CUH-10 CUH-11	VEST. 074 CIRC. 073
3/4"C, 2-#12, 1-#12 GROUND	2L1-3	EC	NF	1	20/1	X											1	FCU-1	1ST GRADE 033
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	2L1-13 2L1-13	EC EC	NF	1	20/1	X X											1	FCU-2 FCU-3	2ND GRADE 034 2ND GRADE 036
3/4°C, 2-#10, 1-#10 GROUND	L3-2	INT			20/1	~											1	FCU-4 FCU-5	2ND GRADE 038 2ND GRADE 038 SPEC. ED. 039
3/4°C, 2-#10, 1-#10 GROUND 3/4°C, 2-#10, 1-#10 GROUND 3/4°C, 2-#10, 1-#10 GROUND	L1A-18 L2A-28	INT															1	FCU-6 FCU-7	RCS. STOR. 031 1ST GRADE 029
3/4"C, 4-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	H1-43(45,47) KL-37	EC INT	NF	3R	30/3	x		МС	EC								1	FCU-8 FCU-9	1ST GRADE 029 1ST GRADE 024 PRE-K 019
3/4"C, 2-#12, 1-#12 GROUND	L1A-22	INT			00/1	~											1	FCU-10	PRE-K 013
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L1A-20 L2-60	EC EC	NF NF	1	20/1 20/1	X X											1, 2 1, 2, 6	FCU-11	KG. 011
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L1A-59 KL-40	EC EC	NF NF	1	20/1 20/1	X X											1, 2, 6 1, 2, 3	FCU-12 FCU-13	KG. 007 KG. 004
3/4"C, 2-#12, 1-#12 GROUND	L3-32	INT															1	FCU-14 FCU-15	COLLAB. 003 PE OFFICE 048
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L3-34 L3-36	INT INT															1	FCU-16 FCU-17	TR. WK. RM. 022 GYM STR. 047
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L2-54 L2-56	INT INT															1	FCU-18 FCU-19	CIRC. 097 3RD GRADE 049
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L2-58 L2-60	INT INT															1 1	FCU-20	3RD GRADE 051
3/4"C, 2-#12, 1-#12 GROUND	L2-62	INT															1	FCU-21 FCU-22	3RD GRADE 052 4TH GRADE 053
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L3-11 L3-13	INT INT															1	FCU-23 FCU-24	4TH GRADE 054 4TH GRADE 056
3/4"C, 2-#12, 1-#12 GROUND	L2-52	INT															1	FCU-25 FCU-26	JAN. STR. 057 BOILER RM. 059
3/4"C, 2-#12, 1-#12 GROUND	L3B-23	EC	NF	1	20/1	x											1, 7	FCU-27 FCU-28	OFFICE 065 DRY STR. 064
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L3-30 L3-30	EC EC	NF NF	1	20/1 20/1	X X											1, 7 1, 7	FCU-29 FCU-30	TR LOUNGE 072 KITCHEN 063
3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L3-30 L3-30	EC EC	NF	1	20/1 20/1	X X											1, 7 1, 7	FCU-31	MUSIC 087
3/4"C, 2-#12, 1-#12 GROUND	L1-25	EC	NF	1	20/1	x											8	FCU-32 FCU-33	ART 089 ELL 084
3/4"C, 2-#12, 1-#12 GROUND	L1-25	EC	NF	1	20/1	X											8	FCU-34 FCU-35	ELL 084 SPEECH 083
																		FCU-36 FCU-37	SPEECH 083 ALT. LEARN 101
																		FCU-38 FCU-39	TR. WR. 082
																		FCU-40	CIRC. 073
																		FCU-41	5TH GRADE 078
																		FCU-42 FCU-43	5TH GRADE 077 5TH GRADE 076
																		FCU-44 FCU-45	MEZZ. 201 MEZZ. 201
																		FCU-46 FCU-47	SENSORY 026 KITCHEN
																		FCU-48	KITCHEN
																		VAV-1 VAV-2	OPPORTUNITY 108 CONFERENCE 109
																		VAV-3 VAV-4	OFFICE 110
																		VAV-5 VAV-6	OFFICE 114
																		HVAC-1	MDF 093
																		ACCU-1	ROOF
																		SCHEDULE	ABBREVATIONS
H/LOW SWITCH H/LOW/OFF SWITCH	MHL	MOME		GH/LOW			XA/YP XAF		CUIT BREAK		DLE							A EC	AMPACITY ELECTRICAL CONT
	NF	NON-FU	JSED		OFF SWI													EX F	EXISTING EQUIPME
EGRAL WITH EQUIPMENT AL/OFF REMOTE SWITCH	RLA	RUNNI	NG LOAD	AMPS	D INSTALL	ED												FLA FVNR	FULL LOAD AMPS FULL VOLTAGE NOI
MENTARY ON/OFF SWITCH CHANICAL CONTRACTOR		ON/OFF WATTS	= SWITCH															FVR G	FULL VOLTAGE REV GENERAL CONTRAC
																		REMARKS	
DULE AND SPECIFICATIONS TO P						EE SPEC	IFICATIO	NS.										2. PROVID	E AND INSTALL ALL M/ E AND INSTALL LOCAL
DRYER START/RUN CONTROL. FACTURER REQUIMENTS.																			E AND INSTALL 120V, 2 IDUCTORS TO CHILLE
SEE POWER PLANS FOR LOCATION PTACLE FOR PLUG IN OF EQUIPM		TE LOCA	TIONS WI	ITH MEC	HANICAL	TRADES	SS.											6. WIRE TH	CT CONDENSATE PUM IROUGH WALL CONTF E AND INSTALL CEILIN

	I		1		I								1					I		
12			13	14			15				1	6				17				18
				EQUIP	ME	NT	SC	HED	UL	Ε										
N						DI	SCONNI	ECT			FREQUEN	IABLE ICY/SPEED VFD/VSD)		so	OLID STA	ТЕ МОТС	OR STAR	ſER		
EQUIPMENT LOCATION	EQUIPMENT LOAD	VOLTAGE/PHASE	CONDUIT AND CONDUCTOR SIZE	BRANCH CIRCUIT DESIGNATION	PROVIDED BY	FUSED OR NON-FUSED	NEMA ENCLOSURE	DISCONNECT SWITCH SIZE	FUSE RATING	EQUIPMENT MOUNTED CONTROL PANEL	PROVIDED BY	INSTALLED BY	PROVIDED BY	NEMA SIZE	CONTROL	туре	DISCONNECT SWITCH SIZE	FUSE RATING	NEMA ENCLOSURE	REM
0.75	404 1404	400)//0DLL			50	_	0.0	000/0	450											
SITE	424 MCA	480V/3PH	2 SETS - 3"C, 3-#250 KCMIL, 1-#2G	MDP	EC	F	3R	600/6	450									<u> </u>		1
- OFFICE	5 HP, 7.6 FLA	480V/3PH	3/4"C, 4-#10, 1-#10 GROUND	H1-14(16,18)	EC	NF	1	30/3	х		MC	EC								
	15 HP, 21 FLA	480V/3PH	1"C, 4-#8, 1-#10 GROUND	H1-38(40,42)	EC	NF	1	30/3	X		MC	EC								
DF - GYM	15 HP, 21 FLA	480V/3PH	1"C, 4-#8, 1-#10 GROUND	H3-32(34,36)	EC	NF	ЗR	30/3	X		MC	EC								
SUPPLY	25 HP, 34 FLA	480V/3PH	1 1/4"C, 4-#4, 1-#8 GROUND	H1-31(33,35)	EC	NF	1	60/3	Х		МС	EC								
ENTILATION	20 HP, 27 FLA	480V/3PH	1"C, 4-#6, 1-#10 GROUND	H1-37(39,41)	EC	NF	1	60/3	Х		МС	EC								
ST. 032	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-12	INT															
RC. 037	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-12	INT															
ST. 041	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-30	INT															
RC. 097	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-30	INT															
ST. 016	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-5	INT															
RC. 025	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-5	INT															
ST. 001	2.2 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-20	INT														<u> </u>	
MONS 002	2.2 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-20	INT															
RC. 062	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-16	INT															
ST. 074	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-50	INT															
RC. 073	1.4 A	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-50	INT															
RADE 033	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-5																1
RADE 034	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-5																1
RADE 036	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-15																1
RADE 038 C. ED. 039	5 FLA 5 FLA	120V/1PH 120V/1PH	3/4"C, 2-#12, 1-#12 GROUND 3/4"C, 2-#12, 1-#12 GROUND	L3A-15 L1A-30	INT INT															
STOR. 031	1.58 FLA	120V/1PH 120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-30	INT															1
RADE 029	5 FLA	120V/1111 120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-12	INT															1
RADE 023	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-18	INT															1
E-K 019	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-5	INT														<u> </u>	1
E-K 013	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-13	INT														<u> </u>	1
			2, . 2, 2 <i>.</i> . 2, <i>1 a</i> 12 GHC CHD															<u> </u>	<u> </u>	
G. 011	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-13	INT				<u> </u>											1
G. 007	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-6	INT															1
G. 004	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-12	INT															1
LAB. 003	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-12	INT															1
		,		1		1		-		1	-					1	1		4	

				144.00	15.17							
D. 039	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-30	INT							 1, 5
OR. 031	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-12	INT							 1, 5
DE 029	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-18	INT							1, 5
DE 024	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3A-18	INT							1, 5
(019	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-5	INT							1,5
(013	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-13	INT							1,5
011	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-13	INT							 1, 5
			, , , ,									
007	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-6	INT							 1, 5
004	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-12	INT							 1,5
B. 003	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3B-12	INT							1, 5
CE 048	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3-7	INT							1, 5
RM. 022	2.5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3-7	INT							1, 5
R. 047	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3-7	INT							1, 5
097	12 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-	INT							1, 5
DE 049	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-14	INT							1, 5
DE 051	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-14	INT							1, 5
	0121	1200,1111		2000								1,0
DE 052	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND		INT							1 5
			, , , ,	L1A-16								1,5
DE 053	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-16	INT							 1, 5
DE 054	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-12	INT							1, 5
DE 056	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-12	INT							 1,5
R. 057	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-18	INT							1, 5
RM. 059	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-18	INT							1, 5
E 065	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-14	INT	L						1, 5
R. 064	2.5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-14	INT							1, 5
IGE 072	2.5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1-14	INT							1, 5
N 063	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	KL-35	INT							1, 5
		,										., .
087	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-35	INT							1, 5
089	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L1A-35	INT							 1, 5
084	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2A-22	INT							1, 5
084	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2A-22	INT							 1,5
H 083	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2A-22	INT							1, 5
H 083	12 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2A-24	INT							1, 5
RN 101	12 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-44	INT							1,5
R. 082	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2A-26	INT							1, 5
RN 101	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-46	INT							1, 5
073	2.5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-46	INT							1, 5
0/0	2.01 01	1200/1111										1, 0
DE 078	5 FLA	120V/1PH		10.48	INT							 1 5
			3/4"C, 2-#12, 1-#12 GROUND	L2-48								 1,5
DE 077	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-48	INT							 1, 5
DE 076	5 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L2-50	INT							 1, 5
. 201	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	2L1-1	INT							1, 5
. 201	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	2L1-3	INT							1, 5
RY 026	1.58 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	L3-43	INT							1, 5
HEN	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	KL-47	INT							1, 5
HEN	3.16 FLA	120V/1PH	3/4"C, 2-#12, 1-#12 GROUND	KL-47	INT							1, 5
NITY 108	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	х			
NCE 109	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	Х			
TION 102	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	X			
		,										
E 110	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	X			
TION 102	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	Х			
E 114	50W	277V/1PH	3/4"C, 2-#12, 1-#12 GROUND	H2-2	EC	NF	1	20/1	Х			
093	1 MCA	208V/1PH	3/4"C, 3-#10, 1-#10 GROUND	L1A-43(45)	EC	NF	1	30/2	Х			
OF	11 MCA	208V/1PH	3/4"C, 3-#10, 1-#10 GROUND	L1A-43(45)	EC	NF	ЗR	30/2	Х			
					1							
					1							
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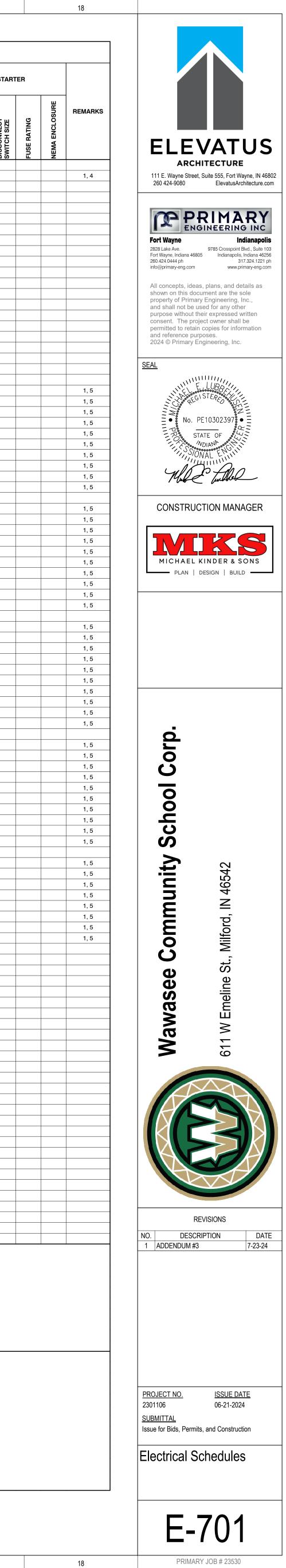
TALL ALL MATERIALS AS INDICATED IN SCHEDULE AND SPECIFICATIONS TO PROVDE A COMPLETE AND OPERATING SYSTEM.

TALL LOCAL MANUAL MOTOR CONTROLLER-DISCONNECT SWITCH WITH THERMAL OVERLOADS, PILOT LIGHT, AUX CONTACTS. SEE SPECIFICATIONS. TALL 120V, 20A/1P RELAY CONTROLLED BY DRYER START/RUN CONTROL.

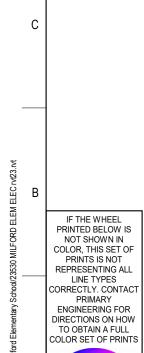
XA/YP X AMP CIRCUIT BREAKER, Y POLE

XAF SWITCH WITH X AMP FUSE(S)

16



1 2	3 4 5 6 7	8 9 10	11 12 13	14 15	16 17 18	8
R	TRANSFORMER SCHEDULE TAG KVA PRIMARY VOLTAGE SECONDARY VOLTAGE TEMP RISE (DEG C) HOUSING FED FROM MOUNTING LOCATION REMARKS	PANEL DESIGNATION: H1 MOUNTING TYPE: SURFACE PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED NEUTR.	MLO: 250 AMPERE VOLTAGE: 277/480 K.A.I.C.: 18 PHASE: 3 FED FROM: DPH WIRE: 4+G WAL BUS VOLTAGE: 277/480	PANEL DESIGNATION:DPHMOUNTING TYPE:SURFACEPANEL REMARKS:METERING, SERHINGED DOOR COVER, COPPER BUS, 100% RATED NEUTRAL BUS	MCB: 1000AF/1000AT GFCI LSI VOLTAGE: 277/480 K.A.I.C.: 65 PHASE: 3 FED FROM: MDP / ATS-OS WIRE: 4+G	
	T-LSL1 30 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 LSH FLOOR ELECTRICAL 1,2 T-L1 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 DPH FLOOR ELECTRICAL 2,2 T-L2 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 H2 FLOOR ELECTRICAL 2,2 T-L2 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 H2 FLOOR ELECTRICAL 1,2 T-L3 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 H3 FLOOR ELECTRICAL 1,2 T-KL 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 H3 FLOOR ELECTRICAL 1,2 T-KL 112.5 480-3Ø 3W 120-208/3Ø 4W 115° C NEMA 1 DPH FLOOR ELECTRICAL 1,2 T-SIGN 7.5 480-1Ø 3W 120-240/1Ø 3W 115° C NEMA 3R H3 FRAME	REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION 1 20A/1P LIGHTS - MEZZ 201, 056-059, 161 3 20A/1P LIGHTS - 049, 051-054 5 20A/1P LIGHTS - 072, 085, 087-089, 091, RR'S	PHASE A (VA) PHASE B (VA) PHASE C (VA) LOAD DESCRIPTION BRK SIZE CKT NO REMARKS 2000	REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION 1 225A/3P PANEL H1	PHASE A (VA) PHASE B (VA) PHASE C (VA) LOAD DESCRIPTION BRK SIZE CKT NO RE 12350	:MARKS
Q	1 REMARKS: 1. PROVIDE AND INSTALL ON VIBRATION ISOLATION PADS PER SPECIFICAITONS. 2. PROVIDE AND INSTALL ON 4" ISOLATED HOUSKEEPING PAD PER SPECIFICATIONS. 3. PROVIDE AND INSTALL ON GALVANIZE STRUT FRAME	1 7 20A/1P 1 9 20A/1P 1 11 20A/1P 1 11 20A/1P 13 20A/1P OS LIGHTS - LC4 BLDG	0 20A/1P 8 1 0 0 20A/1P 10 1 0 0 20A/1P 10 1 0 0 20A/1P 10 1 0 0 20A/1P 12 1 250 0 14 14	3 400A/3P PANEL H2	15460	
P	PANEL DESIGNATION: LSH1 MCB: 100 AMPERE VOLTAGE: 277/480 MOUNTING TYPE: SURFACE K.A.I.C.: 18 PHASE: 3 PANEL REMARKS: FED FROM: SEE RISER WIRE: 4+G HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED NEUTRAL BUS PHASE A PHASE B PHASE C LOAD DESCRIPTION BRK SIZE CKT NO REMARKS	15 20A/2P SITE LIGHTS - LC5 NE 17 19 19 21 15A/3P PUMP P5 5 HP DOAS 23 23 23	1000 2110 AHU-1 - MEZZ 201 15A/3P 16 1000 2110 1000 2110 18 18 2220 6850 2110 18 20 6850 2220 0 20 20 6850 2220 0 0 22 20 6850 2220 0 0 22 20 22 200 2220 0 0 22 24 24	5 400A/3P PANEL H3	75230 SPACE 6 0 31570 - 0 0 - - 82825 0 - - 0 82825 - - 0 82825 - - 0 82825 - - 0 82825 - -	
	REMARKSCKT NO.BRK SizeCKT NO.BRK SizeCKT NO.BRK SizeCKT NO.REMARKS1120A/1PEM LIGHTS - OUTSIDE ENTRIES 350 -EM LIGHTS - SOUTH EAST20A/1P2-320A/1PEM LIGHTS - NORTH EAST15001200-EM LIGHTS - EAST CIRCULATION20A/1P4-1520A/1PEM LIGHTS - NORTH EAST1720A/1P20A/1P1720A/1P20A/1P	25 27 15A/3P PUMP P6 5 HP DOAS 29 31 31 31	2220 6850 6850 6850 3880 2220 26 26 3880 2220 30A/3P 28 3880 2220 3080 30 9420 3880 3880 32	9 SPACE	0 0 10 0 0 -	
Ν	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	33 70A/3P DOAS-1.1 SUPPLY 35 35 000000000000000000000000000000000000	9420 9420 30A/3P 34 3880 9420 36 36 3880 9420 36 36 7480 3880 3880 36 7480 3880 3880 36 7480 3880 40 40 5820 7480 40 42	10 SPACE	0 SPACE 12 0 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
 M	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	43 20A/3P EF-4 REFRIGERANT 47 49 49	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	REMARKS	0 0 201,105 323,504 258,951	
	27 50A/3P T-LSL1 / LSL2 11200 1600 PANEL LSH2 60A/3P 28 29 29 14,350 14,750 6,500 30 <t< td=""><td>51 53 REMARKS 1. PROVIDE SPARE CIRCUIT BREAKER, AS INDICATED, IN SPACE. SPARE C</td><td>0 52 0 0 0 51,780 51,780 51,130 50,230 51,130</td><td>PANEL DESIGNATION: BH MOUNTING TYPE: SURFACE PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED N</td><td>MLO: 250 AMPERE VOLTAGE: 277/480 K.A.I.C.: 18 PHASE: 3 FED FROM: MDP WIRE: 4+G EUTRAL BUS VOLTAGE: 277/480</td><td></td></t<>	51 53 REMARKS 1. PROVIDE SPARE CIRCUIT BREAKER, AS INDICATED, IN SPACE. SPARE C	0 52 0 0 0 51,780 51,780 51,130 50,230 51,130	PANEL DESIGNATION: BH MOUNTING TYPE: SURFACE PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED N	MLO: 250 AMPERE VOLTAGE: 277/480 K.A.I.C.: 18 PHASE: 3 FED FROM: MDP WIRE: 4+G EUTRAL BUS VOLTAGE: 277/480	
L	PANEL DESIGNATION: LSH2 MLO: 125 AMPERE VOLTAGE: 277/480 MOUNTING TYPE: SURFACE K.A.I.C.: 18 PHASE: 3	PANEL DESIGNATION: H2 MOUNTING TYPE: SURFACE	MLO: 400 AMPERE VOLTAGE: 277/480 K.A.I.C.: 18 PHASE: 3	REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION 1 1 3 60A/3P PUMP P-1 CH WATER RM 05 5 5	PHASE A (VA) PHASE B (VA) PHASE C (VA) LOAD DESCRIPTION BRK SIZE CKT NO RE 7480 7480 2 <td< td=""><td>:MARKS</td></td<>	:MARKS
	PANEL REMARKS: WIRE: 4+G WIRE: 4+G HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED NEUTRAL BUS PHASE A PHASE B CKT NO. BRK SIZE CKT NO. PHASE A PHASE A PHASE B PHASE C LOAD DESCRIPTION BRK SIZE CKT NO. REMARKS 1 20A/1P EM LIGHTS - OUTSIDE ENTRIES 250 EM LIGHTS - WEST CIRCULATION 20A/1P 2	PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED NEUTR. REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION 1 20A/1P LIGHTS - 069, 071	FED FROM: DPH WIRE: 4+G NAL BUS PHASE A PHASE B PHASE C LOAD DESCRIPTION BRK SIZE CKT NO REMARKS 2500 VAV-1 THRU VAV-6 20A/1P 2 2	7 9 SPACE 11 13 13	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	3 20A/1P LIGHTS - 101,079,081-084,086 5 20A/1P LIGHTS - 094,096,098 7 20A/1P SITE LIGHTS - LC3 1 9 20A/1P 1 11 20A/1P	2000 2000 LIGHTS - 076,077,078 20A/1P 4 2000 2000 2200 2700 LIGHTS - 102-112, 114-117 20A/1P 6 200 1200 200 LIGHTS - 073, 074, 080 20A/1P 8 1200 0 10 1 0 0 20A/1P 10 1 0 0 20A/1P 12 1	15 SPACE 17 19 21 SPACE 23 SPACE	0 SPACE 16 0 0 18 0 0 20 0 0 22 0 0 24	
J	Image: Constraint of the symbol of	13 20A/2P SITE LIGHTS - LC3 15 17 20A/1P 19 20A/1P	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	25 27 SPACE 29 REMARKS SPACE	0 0 26 0 0 5 28 0 0 30 30 14,960 14,960 14,960 14,960	
		21 20A/1P 23 20A/1P 25 20A/1P 27 20A/1P 29 20A/1P	0 20A/1P 22 0 0 20A/1P 22 0 0 20A/1P 24 0 0 20A/1P 24 0 0 20A/1P 24 0 0 14236 20A/1P 24 14236 0 11000 1000 1000			
H	PANEL: SIGN MCB: 40 AMPERE VOLTAGE: 120/240 MOUNTING TYPE: SURFACE K.A.I.C.: 22 PHASE: 1 PANEL REMARKS: FED FROM: H3 / T-SIGN WIRE: 3+G NEMA 3R, HINGED COVER, COPPER BUS, 100% RATED NEUTRAL BUS PHASE A (VA) PHASE B (VA) LOAD DESCRIPTION BRK SIZE CKT NO REMARKS	REMARKS	71,734 19,696 5,900 RCUIT BREAKER SHALL BE TURNED IN THE OFF POSITION AT END OF CONSTRUCTION.	PANEL DESIGNATION: KH MOUNTING TYPE: FLUSH PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED N REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION	PHASE A PHASE B PHASE C LOAD DESCRIPTION BRK SIZE CKT NO DE	EMARK
G	Image: Second local	PANEL DESIGNATION: H3 MOUNTING TYPE: SURFACE PANEL REMARKS: HINGED DOOR WITHIN HINGED COVER, COPPER BUS, 100% RATED NEUTR	MLO: 400 AMPERE VOLTAGE: 277/480 K.A.I.C.: 18 PHASE: 3 FED FROM: DPH WIRE: 4+G	1 3 40A/3P ST ITEM 21 - DBL DECK CONVECTION 5 1 7 SHUNT TRIP	(VA) (VA) (VA) 8310 2 8010 2	 1
	$ \left\{ \begin{array}{c c c c c c c c c c c c c c c c c c c $	REMARKS CKT NO. BRK SIZE LOAD DESCRIPTION 1 20A/1P LIGHTS - 001, 002, 016, 025, 097 3 20A/1P LIGHTS - 003-008, 011-015, 020	PHASE A (VA) PHASE B (VA) PHASE C (VA) LOAD DESCRIPTION BRK SIZE CKT NO REMARKS 1960 1300 LIGHTS - 023, 032, 037, 041, 097 20A/1P 2 1300 3425 LIGHTS - 033, 034, 036, 038, 039 20A/1P 4	9 11 13 ITEM 21 - DBL DECK CONVECTION 1 15 SHUNT TRIP	8310 8310 10 0VEN 8010 8010 12 8310 8010 0 14 8010 0 5540 16	
F	Image: 17 Image: 0 18 0 3,840 1,920 Image: 1. PROVIDE AND INSTALL SPARE 20A/1P BREAKER Image: 1. PROVIDE AND INSTALL SPARE 20A/1P BREAKER	5 20A/1P LIGHTS - 017,018,022,026,027,035,044-04 7 20A/1P LIGHTS - EXTERIOR - W ENTRIES 1 9 20A/1P 1 11 20A/1P 1 11 20A/1P	800 1935 0 LIGHTS - 043 RELAY R1 20A/1P 8 1935 0 LIGHTS - 043 RELAY R1 20A/1P 10 1935 0 LIGHTS - 043 RELAY R2 20A/1P 10 1935 0 LIGHTS - 043 RELAY R2 20A/1P 10 600 1290 LIGHTS - 043 RELAY R3 20A/1P 12 600 20A/1P 14 1	17 17 19 30A/3P ST 21 30A/3P ST 1 23 25 SHUNT TRIP	5540 780 18 5540 154/3P 20 780 154/3P 20 780 780 22 780 1665 1665 1100 1100 1100 1100 1100 1100	
E		20A/2P LIGHTS SITE - WALKWAY POLES N/W/S 15 17 17 20A/2P 19 20A/2P 21 20A/1P 23 20A/1P	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27 40A/3P ST ITEM 23 - DBL DECK BOILERLESS (29 1 31 33 SHUNT TRIP 35 ITEM 23 - DBL DECK BOILERLESS (8010 28 1665 8010 1665 8010 3990 3990 11EM 58 - AIR CURTAIN 20A/3P 20A/3P 32 34	
		23 20A/1P 25 20A/1P 27 20A/1P 29 20A/1P 31 20A/1P	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	35 40A/3P ST ITEM 23 - DBL DECK BOILERLESS (1 39 SHUNT TRIP 41 43	2000 36 8010 2600 2600 11EM 28.1-2 - HOOD SUPPLY / EXHAUST 15A/3P 38 40 40 40 2600 19590 11590 100A/3P 44	
D		33 20A/1P 35 20A/1P 37 39 41 41	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	45 47 49 51 53	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
		REMARKS	9610 42 19,915 90,190 23,175 RCUIT BREAKER SHALL BE TURNED IN THE OFF POSITION AT END OF CONSTRUCTION. 42	REMARKS 1. SHUNT TRIP CONTROLLED BY KITCHEN HOOD CONTROL PANEL. F	0 1 2 82,825 82,825 82,825	



				14236		4														
29	20A/1P				0 1000			30												
			71,734	19,696	5,900					PANEL DES	IGNATION: K	H		MLO:	400 AMPERE		VOLTAGE	: 277/480		
<u>MARKS</u> BOVIDE SPARE CIRCUI	IT BREAKE	R, AS INDICATED, IN SPACE. SPARE CIR	CUIT BREAKE	R SHALL BE TI	IRNED IN THE	OFF POSITION AT END OF CONSTRUC	TION			MOUNTING		USH		K.A.I.C.:	18			3		
														FED FROM:	DPH		WIRE:	4+G		
										HINGED DOG		GED COVER	R, COPPER BUS, 100% RATED NEUTRA	LBUS						
										REMARKS		RK SIZE	LOAD DESCRIPTION	PHASE A	PHASE B	PHASE C	LOAD DESCRIPTION	BRK SIZE		REMA!
														(VA) 8310	(VA)	(VA)				
											1			8010	8310	-	ITEM 23 - DBL DECK BOILERLESS		2	
	-13		MLO:	400 AMPERE		VOLTAGI	: 277/480				3 40	A/3P ST	M 21 - DBL DECK CONVECTION OVEN		8010	0010	СОМВІ	40A/3P ST	T	
UNTING TYPE: S	URFACE		K.A.I.C.:	18		PHASE:					5					8310 8010	-	,	6	
			FED FROM:	DPH		WIRE:	4+G			1	7		SHUNT TRIP	0			SHUNT TRIP		8	1
	NGED COV	ER, COPPER BUS, 100% RATED NEUTRA	LBUS								9			0	8310				10	-
EMARKS CKT NO. B	RK SIZE	LOAD DESCRIPTION	PHASE A	PHASE B	PHASE C	LOAD DESCRIPTION	BRK SIZE		REMARKS		11	ITE	M 21 - DBL DECK CONVECTION OVEN		8010	8310	ITEM 23 - DBL DECK BOILERLESS		12	
			(VA) 1960	(VA)	(VA)						40	A/3P ST		8310	-	8010	СОМВІ	40A/3P ST	т — — — — — — — — — — — — — — — — — — —	
1	20A/1P	LIGHTS - 001, 002, 016, 025, 097	1300	0.405		LIGHTS - 023, 032, 037, 041, 097	20A/1P	2			13			8010					14	
3	20A/1P	LIGHTS - 003-008, 011-015, 020		3425 3180	_	LIGHTS - 033, 034, 036, 038, 039	20A/1P	4		1	15		SHUNT TRIP		0		SHUNT TRIP		16	1
5	20A/1P L	IGHTS - 017,018,022,026,027,035,044-048			1335 2120	LIGHTS - 019, 021, 024, 029-031	20A/1P	6			17					5540 780	-		18	
7	20A/1P	LIGHTS - EXTERIOR - W ENTRIES	800 1935	-		LIGHTS - 043 RELAY R1	20A/1P	8			19	A IOD OT	ITEM 22 - TILT SKILLET	5540 780	-		ITEM 51 - DISPOSER / CONTROLS	15A/3P	20	
1 9	20A/1P			0 1935		LIGHTS - 043 RELAY R2	20A/1P	10			21 30	A/3P ST			5540 780				22	
1 11	20A/1P		•		0 1290	LIGHTS - 043 RELAY R3	20A/1P	12		1	23		SHUNT TRIP			0 1665	-		24	
13			600 0	-			20A/1P	14	1		25			8010 1665			ITEM 52 - DISPOSER / CONTROLS	15A/3P	26	
15	20A/2P	LIGHTS SITE - WALKWAY POLES N/W/S		600			20A/1P	16	1		27		M 23 - DBL DECK BOILERLESS COMBI		8010 1665	-			28	
17			•		3000 0	-	20A/1P	18	1		29 40	A/3P ST				8010 3990	-		30	
19	20A/2P	SIGN PANEL	3000	-			20A/1P	20	1	1	31		SHUNT TRIP	0 3990			ITEM 58 - AIR CURTAIN	20A/3P	32	-
21	20A/1P			0	-		20A/1P	22			33				8010 3990	-			34	
23	20A/1P		•		0	-	20A/1P	24			35	ITE	M 23 - DBL DECK BOILERLESS COMBI			8010 2600	-		36	
25	20A/1P		0	-			20A/1P	26			37 40	A/3P ST		8010 2600			ITEM 28.1-2 - HOOD SUPPLY / EXHAUST	15A/3P	38	-
27	20A/1P			0	-		20A/1P	28		1	39		SHUNT TRIP		0 2600				40	
29	20A/1P		•		0		20A/1P	30			41					0 19590	-		42	
31	20A/1P		0 5820					32			43			0 19590			ITEM 14 - RACK CONVEYOR DISHWASHER	100A/3P	44	
33	20A/1P			0 5820	-	AHU-3 ROOF	40A/3P	34			45				0 19590	-			46	
35	20A/1P				0 5820	-		36			47			-		0	_		48	
37			0 4500					38			49			0					50	
39				0 75230	-	TRANSFORMER T-L3	175A/3P	40			51				0				52	
41					0 9610			42			53					0	-		54	
1	I		19,915	90,190	23,175			-1			· · · · · ·	I		82,825	82,825	82,825				

GENERATOR SCHEDULE													
MANUFACTURER	MODEL	DIMENSIONS (L x W x H)	FUEL TYPE	FUEL CAPACITY (HOURS)	VOLTAGE	CIRCUIT BREAKER #1	CIRCUIT BREAKER #2	ENCLOSURE TYPE	REMARKS				
GENERAC	SD750	228" x 71" x 139"	DIESEL	24	480 / 277 V, 3Ø, 4W	100A/3P; 100%	1000A/3P, 100% RATED	SOUND ATTENUATION LEVEL 2	1, 3, 4, 5, 6, 7				
 FURNISH AND INST. PROVIDE MINIMUM APPROVED EQUAL 	ALL ALL COMM ALL ALL COMM OF 4 FOOT WO GENERATOR M AND QUANTITY	IUNICATIONS BETWEEI IUNICATIONS BETWEEI DRKSPACE AROUND PE IANUFACTURER SHALL	N GENERATOR AND RIMETER OF UNIT F BEAR ANY ADDITIO	BMS. COORDINATE OR WORKING CLEA NAL COSTS FOR IN	E WITH PROPER TRAD RANCES. CREASED PAD SIZE.	ES.	ER. IONS AND CONTROLS.						

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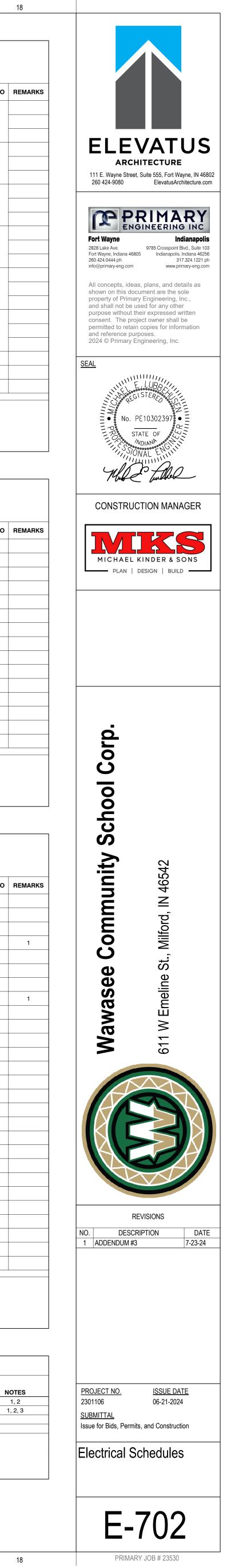
14

		AUTOMAT							
TAG	PANEL SERVED	LOCATION	VOLTAGE	PHASE	AMPS	NEUTRAL TYPE	TRANSITION TYPE	NEMA ENCL.	NOTES
ATS-1	LSH	ELECTRICAL ROOM	480 / 277 V	зØ	100A/4P	SOLID	OPEN	1	1, 2
ATS-2	OSH	ELECTRICAL ROOM	480 / 277 V	3 Ø	1000A/4P	SOLID	OPEN	1	1, 2, 3
otes : Furnisi	H AND INSTALL ALL	COMMUNICATIONS BETWE	EN ATS AND BMS.	COORDINAT	E WITH PROP	ER TRADES.			

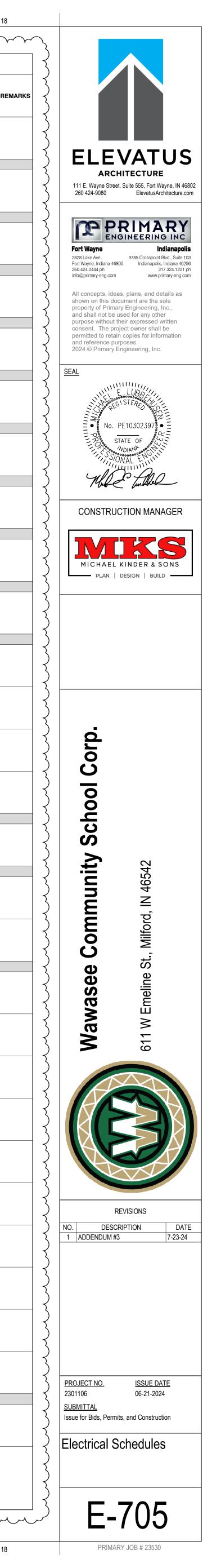
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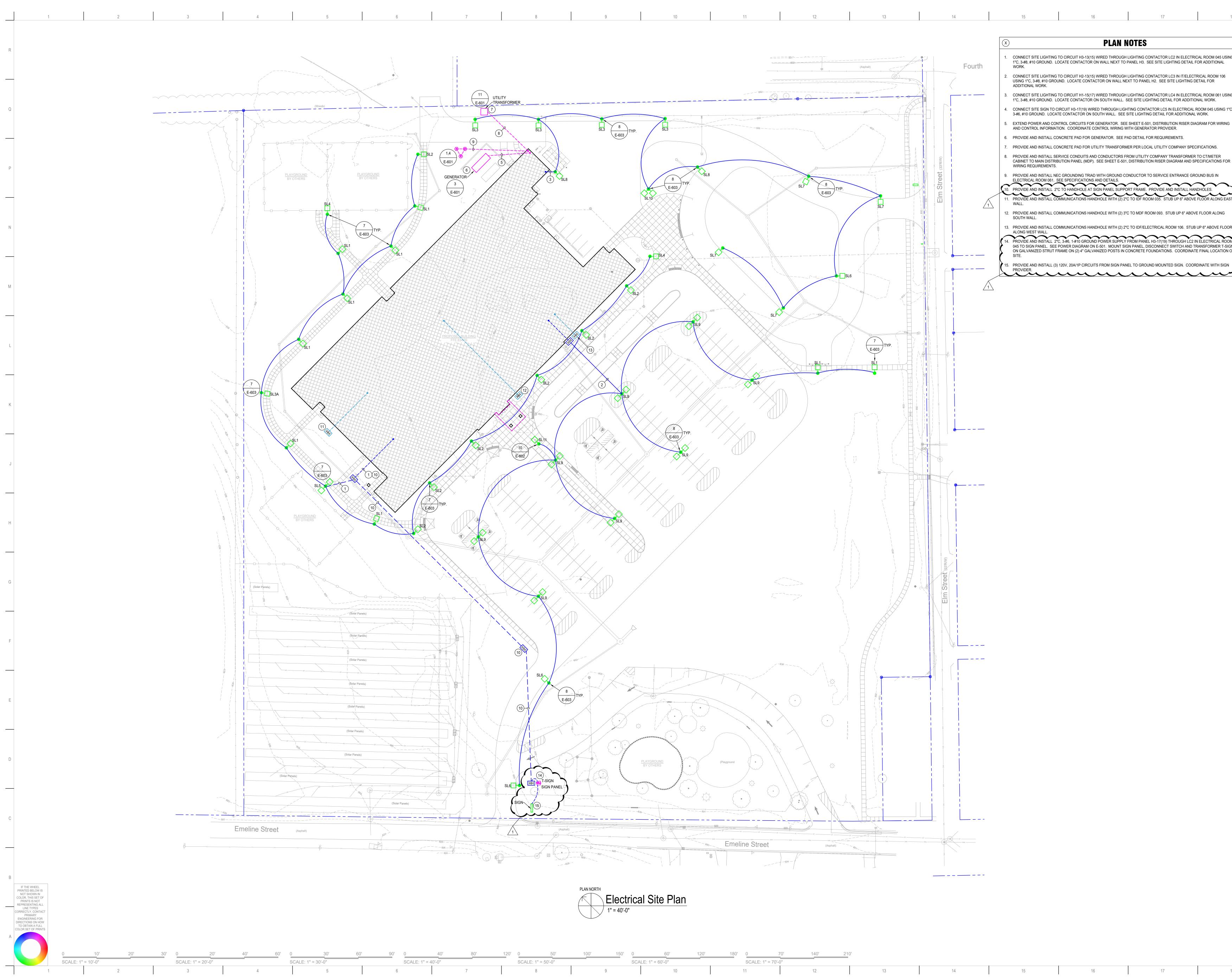
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2. FURNISH AND INSTALL ALL COMMUNICATIONS BETWEEN REMOTE ANNUNCIATOR (GAP) AND ATS. 3. FURNISH AND INSTALL ON 4" HOUSEKEEPING PAD PER SPECIFICATIONS.



	SCHEDU			GHT FIXTURE SCHEDULE
TAG MANUFACTURER'S CATALOG NUMBER MAX. WATTS MOUN	T MIN. LUMEN OUTPUT *(D/I)	CRI DESCRIPTION REMARKS	TAG MANUFACTURER'S CATALOG NUMBER	MAX. WATTS MOUNT MIN. UMEN OUTPUT *(D/I) CCT CRI DESCRIPTION
	ED 2,800 4000	120-277V, 2"(5'X9') LINEAR STRIP (L PATTERN) FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE 80	PORTFOLIO #LD6C109040D010M1H PRESCOLITE #LFR-6RD-M-10L40K9-MD-DM1/ LFR-6RD-T-SS/ LFR-6RD-H DL1	10 RECESSED 994 4000 90 120-277V, 6" DIAMETER DOWNLIGHT WITH MEDIUM DISTRIBUTION SELF-FLANGED SEMI-SPECULAR CLEAR REFLECTOR. ELECTRONIC
MARK # LUMENWERX #VIA2RPAT-D-HLO-FH-SW-80-200-40-16'(10'X6')-1LEV2C(90)-UNV-D1-1C-DTL-W		120-277V, 2"(10'X6') LINEAR STRIP (L PATTERN) FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING, ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE		SAME AS DL1 EXCEPT WITH GENERATOR TRANSFER DEVICE
MARK #	ED 3,200 4000	80 FROM 100% TO 1%. UL LISTED. ILLUMINATED CORNERS.	PORTFOLIO #LD6C159040D010M1H PRESCOLITE #LFR-6RD-M-15L40K9-MD-DM1/ LFR-6RD-T-SS/ LFR-6RD-H GOTHAM #EVO6-40/15-AR-MD-LSS-MVOLT-GZ1	16RECESSED1,471400090120-277V, 6" DIAMETER DOWNLIGHT WITH MEDIUM DISTRIBUTION SELF-FLANGED SEMI-SPECULAR CLEAR REFLECTOR. ELECTRONIC DRIVER WITH RANGE FROM 100% TO 1%. WET LOCATION. UL LIST
L16-33 LUMENWERX #VIA2RPAT-D-HLO-FH-SW-80-200-40-33'(13'X20')-1LEV2C(90)-UNV-D1-1C-DTL-W 60 RECESS MARK # 60 RECESS	ED 6,600 4000	120-277V, 2"(13'X20') LINEAR STRIP (L PATTERN) FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE 80 FROM 100% TO 1%. UL LISTED. ILLUMINATED CORNERS.	DL2A PORTFOLIO #LD6C209040D010N1H	SAME AS DL2 EXCEPT WITH GENERATOR TRANSFER DEVICE 120-277V, 6" DIAMETER DOWNLIGHT WITH NARROW DISTRIBUTION SELF-FLANGED SEMI-SPECULAR CLEAR REFLECTOR, ELECTRON
L16-33A SAME AS L16-33 EXCEPT WITH GENE LUMENWERX #VIA2RPAT-D-HLO-FH-SW-80-200-40-33'(22'X13')-1LEV2C(90)-UNV-D1-1C-DTL-W	ERATOR TRANSFER DE	EVICE 120-277V, 2"(22'X13') LINEAR STRIP (L PATTERN) FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING, ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE	DL3 PRESCOLITE # GOTHAM #	23 RECESSED 2,000 4000 90 DRIVER WITH RANGE FROM 100% TO 1%. WET LOCATION. UL LIS
L16-35 LITECONTROL # MARK # 64 RECESS	ED 7,000 4000		DL3A METALUX #24CZSCT3-SQR-UNV-LOW COLUMBIA #LCAT24-40MWG-R-EDU	SAME AS DL3 EXCEPT WITH GENERATOR TRANSFER DEVICE SAME AS DL3 EXCEPT WITH GENERATOR TRANSFER DEVICE 120-277V, 2'X4' ARCHITECTURAL LENSED TROFFER WITH SQUARE ACRYLIC LENS AND COLD ROLLED STEEL HOUSING. ELECTRONIC 31 RECESSED 3,626 4000 80 DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED
L16-45 L1	ED 9,000 4000		L1A LITHONIA #2BLT4-40L-SDPT-EZ1-LP840	SAME AS L1 EXCEPT WITH GENERATOR TRANSFER DEVICE
LUMENWERX #VIA2RPAT-D-HLO-FH-SW-80-200-40-53'(20'X33')-1LEV2C(90)-UNV-D1-1C-DTL-W LITECONTROL #	ED 10.000 1000	120-277V, 2"(20'X33') LINEAR STRIP (L PATTERN) FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED. ILLUMINATED CORNERS.	L2 METALUX #24CZSCT3-SQR-UNV-MEDIUM COLUMBIA #LCAT24-40MLG-R-EDU LITHONIA #2BLT4-48L-SDPT-EZ1-LP840	40RECESSED5,026400080120-277V, 2'X4' ARCHITECTURAL LENSED TROFFER WITH SQUAR ACRYLIC LENS AND COLD ROLLED STEEL HOUSING. ELECTRON DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED
L16-53 MARK # 96 RECESS LUMENWERX #VIA4RPAT-D-HLO-FH-SW-80-350-40-55'(23'X18'X14')-2LEV2C(90)-UNV-D1-1C-DTL-W 96 RECESS	ED 10,600 4000	120-277V, 4"(23'X18'X14') LINEAR STRIP (U PATTERN) FIXTURE WITH FROSTED LENS	L2A METALUX #24CZSCT3-SQR-UNV-HIGH	SAME AS L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE Image: Same as L2 EXCEPT WITH GENERATOR TRANSFER DEVICE
L17-55 L17-55 L17-55 L17-55-(23-18-14)-SOF-C1-40K9-D035-1C-UNV-(2)C90L L160 RECESS	ED 19,250 4000	AND EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED. ILLUMINATED CORNERS.	L3 COLUMBIA #LCAT24-VLG-R-EDU LITHONIA #2BLT4-60L-SDPT-EZ1-LP840	53 RECESSED 6,250 4000 80 ACRYLIC LENS AND COLD ROLLED STEEL HOUSING. ELECTRON DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED
L18-10 LUMENWERX #VIA4P-DI-HLO-1.5D-CLO-SW-80-350-350-40-10'-UNV-D1-1C-ACS-B LITECONTROL #4L-P-ID-STD-10-10-DRP-C5-40K9-I035-D035-D01-1C-UNV-FA2 51 SUSPENI	DED 7,000 4000	ALUMINUM HOUSING WITH UP AND DOWN LIGHTING. ELECTRONIC 0-10V DIMMING	L3A METALUX #24CZ2-75HE-SQR-UNV-L840-CD1-U COLUMBIA #LCAT24-XLG-R-EDU	SAME AS L3 EXCEPT WITH GENERATOR TRANSFER DEVICE 120-277V, 2'X4' ARCHITECTURAL LENSED TROFFER WITH SQUARE ACRYLIC LENS AND COLD ROLLED STEEL HOUSING. ELECTRONI
L18-10A SAME AS L18-10 EXCEPT WITH GENE	ERATOR TRANSFER DE		L4 LITHONIA #2BLT4-72L-SDPT-EZ1-LP840	63 RECESSED 7,493 4000 80 DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED
BETA CALCO #984140-D40-N40-S1-D1-BL-AP00 FINELITE #HP-2-P-ID-15-B-B-840-WSO-DSO-96LG-277-SC-FC-1%-FA50-C1-FB-(3)60DEG CORNERS 100 SUSPEND	DED 13,104 4000	EXTRUDED ALUMINUM HOUSING WITH UP AND DOWN LIGHTING ELECTRONIC 0-10V	L5	SAME AS L4 EXCEPT WITH GENERATOR TRANSFER DEVICE 42 SUSPENDED 5,252 4000 80 120-277V, 4' LINEAR STRIP FIXTURE WITH FROSTED LENS AND CO HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FR LISTED
LUMENWERX #VIA2W-D-ARO2-FH-SW-80-500-40-58'-UNV-D1-1C-DMB-W FINELITE #HP-2-WM-D-58-TL500-840-K-96LG-SC-FC-1%-MB-FE-SW L20-58 255	. 29.000 4000	120-277V, 2"X 58' LINEAR WALL WASH STRIP FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE 80		SAME AS L5 EXCEPT WITH GENERATOR TRANSFER DEVICE
L20-58 MARK #S2WD-LLP-58FT-MSL8-80CRI-40K-500LMF-WG-SCT-MIN1-FLL-MVOLT-WHTT-ZT 255 WALL PURE EDGE VAIL SERIES #VCE-5WDC-83FT-ST40K PURE EDGE VAIL SERIES #VCE-5WDC-83FT-ST40K Image: Comparison of the series and the series are series and the series and the series are series and the series and the series are series and the series are series and the series are	20,000 4000	120V - 24V LED 5/8" RECESSED DRYWALL WALL COVE, 83LF OVERALL (34'+15'+34'	L6 METALUX #24GR-LD5-64-FGW080-UNV-L840-CD1-U COLUMBIA #LJT24-40VLG-FSSFA-EDU-C588 LITHONIA #2GTL-4-60L-SWL-GZ10-LP840	59RECESSED6,467400080120-277V, 2'X4' ARCHITECTURAL LENSED TROFFER WITH FROSTE AND COLD ROLLED STEEL HOUSING. ELECTRONIC 0-10V DIMMIN RANGE FROM 100% TO 1%. UL LISTED
L21 KLUS DESIGN #C0958-NA-FC-40-1210/4-24-TBD-ADH-TBD-1P20-10V 415 RECESS OMNI LIGHT # OCH-083R 415 RECESS 415 </td <td>ED 20,300 4000</td> <td></td> <td>L6A METALUX #22CZSCT3-SQR-UNV-HIGH</td> <td>SAME AS L6 EXCEPT WITH GENERATOR TRANSFER DEVICE</td>	ED 20,300 4000		L6A METALUX #22CZSCT3-SQR-UNV-HIGH	SAME AS L6 EXCEPT WITH GENERATOR TRANSFER DEVICE
PURE EDGE (3) #ST2A-PIN-24V-9-35K + (2) #ST2A-PIN-24V-3-35K + (4) #SS-CFX-6IN CONTECH LIGHTING #TLT24V-1-4K-(4 + 33CR) SERIES 70 SURFACE L22 KLUS DESIGN #35556-W-LC-40-0480/1-TBD-AM-24-TBD-IP20-10V 70 SURFACE	CE 11,600 4000	120V - 24V DIMMABLE LED TAPE STRIP, 33 LF OVERALL, WITH (4) CORNER CONNECTORS, END FEED, STATIC WHITE, IN SUPPORT CHANNEL WITH FROST LENS, C-SHAPE, SURFACE MOUNT. POWER SUPPLY / DIMMABLE DRIVER.	L7 L7L7COLUMBIA #LCAT22-40HLG-R-EDU LITHONIA #2BLT2-40L-SDPT-EZ1-LP840	34 RECESSED 3,833 4000 80 ACRYLIC LENS AND COLD ROLLED STEEL HOUSING. ELECTRON DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED
OMNI LIGHT# GEN2-35-HO METALUX # UHB-24-UNV-L840-CD-U (BLACK) ILP #BB4-14L/21L/28L-U-CCTS-BLK-FBL		120-277V, 14"-15" DIAMETER ROUND FIXTURE WITH FIXTURE HOOK AND 6 FOOT CORD WITHOUT PLUG WITH 0-10V DIMMING. UL LISTED. DLC QPL LISTED. FURNISH AND	LUMENWERX #VIA4R-D-HLO-FH-SW-80-1000-40-8-UNV-D1-1C-TB15-W LITECONTROL #4L-LG-D-8-08-SOF-C1-40K9-D100-D01-1C-UNV	SAME AS L7 EXCEPT WITH GENERATOR TRANSFER DEVICE 120-277V, 4"X 8' LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM 80. BECESSED 8 000 4000 80 HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FR
PL1 LITHONIA #JEBL-30000LM-PFL-MVOLT-40K-80CRI-DBLXD 215 SUSPENI	DED 25,715 4000		L8-8 MARK #SL4L-LOP-8FT-FLP-TG-80CRI-40K-1000LMF-MIN1-277V	80 RECESSED 8,000 4000 80 HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FF LISTED. 120-277V, 2"X 3' LINEAR STRIP FIXTURE WITH FROSTED LENS AND
MCGRAW EDISON #IST-SA1B-740-U-T4FT-BZ BEACON #TRP2-160L-25-4K7-4F-UNV-DBT 25 WALL	3,000 4000	120/277V, 4000K CCT L.E.D., WALL MOUNTED FIXTURE WITH TYPE 4 FORWARD THROW DISTRIBUTION. ELECTRONIC DRIVER <20% TOTAL HARMONIC DISTORTION. UL LISTED.	LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-3-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-3-03-SOF-C1-40K9-D035-D01-1C-UNV MARK #SL2L-LOP-3FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V	12 RECESSED 1,050 4000 80 HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FF
LITHONIA #WST LED-P2-40K-VF-MVOLT-DDBXD BL1A SAME AS BL1 EXCEPT WITH GENER	RATOR TRANSFER DEV		LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-6-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-6-06-SOF-C1-40K9-D035-D01-1C-UNV	23 RECESSED 2.100 4000 80 120-277V, 2"X 6' LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM
MCGRAW EDISON #IST-SA1B-740-U-T4W-BZ BEACON #TRP2-160L-25-4K7-4W-UNV-DBT LITHONIA #WST LED-P2-40K-VW-MVOLT-DDBXD 25 WALL	. 3,000 4000	120/277V, 4000K CCT L.E.D., WALL MOUNTED FIXTURE WITH TYPE 4 WIDE DISTRIBUTION.	MARK #SL2L-LOP-6FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-9-UNV-D1-1C-DTL-W	LISTED. 120-277V, 2"X 9' LINEAR STRIP FIXTURE WITH FROSTED LENS AN AI UMINUM
BL2A SAME AS BL2 EXCEPT WITH GENER LUMARK #PRV-C15-D-UNV-T2-SA-BZ / POLE #SSA-4-M-12-W-F-*-1-F-G-V Image: Constraint of the second sec	RATOR TRANSFER DEV	/ICE 120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH TYPE 2	L9-9 LITECONTROL #2L-PT-D-9-09-SOF-C1-40K9-D035-D01-1C-UNV MARK #SL2L-LOP-9FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V	34 RECESSED 3,150 4000 80 HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FF LISTED.
SL1 EXO #ASL1-160L-70-4K7-2-UNV-A-DBT / POLE HAPCO #SSA12D4-4-BM-VD-DBL NUT 70 POLE LITHONIA #RSX1-LED-P1-40K-R2-MVOLT-SPA-DDBXD / POLE #SSA-12-4G-DM19AS-VD-DDBXD 70 POLE	7,121 4000	CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER.	LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-12-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-12-12-SOF-C1-40K9-D035-D01-1C-UNV	SAME AS L9-9 EXCEPT WITH GENERATOR TRANSFER DEVICE 120-277V, 2"X 12" LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH TO 1% ULL USTED
LUMARK #PRV-C15-D-UNV-T3-SA-BZ / POLE #SSA-4-M-12-W-F-*-1-F-G-V EXO #ASL1-160L-70-4K7-3-UNV-A-DBT / POLE HAPCO #SSA12D4-4-BM-VD-DBL NUT ILITHONIA #RSX1-LED-P1-40K-R3-MVOLT-SPA-DDBXD / POLE #SSA-12-4G-DM19AS-VD-DDBXD	7,096 4000	120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH TYPE 3 DISTRIBUTION. ELECTRONIC DRIVER <20% TOTAL HARMONIC DISTORTION. UL	L9-12 MARK #SL2L-LOP-12FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V	44 RECESSED 4,200 4000 80 TO 1%. UL LISTED. CAME AS L9-12 EXCEPT WITH GENERATOR TRANSFER DEVICE
LUMARK #PRV-C15-D-UNV-T3-SA-BZ-HSS / POLE #SSA-4-M-9.5-W-F-*-1-F-G-V EXO #ASL1-160L-70-4K7-3-UNV-A-DBT-BC / POLE HAPCO #SSA9.5D4-4-BM-VD-DBL NUT		VERIFY COLOR PRIOR TO PLACING ORDER. 120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH TYPE 3 DISTRIBUTION AND HOUSE SIDE SHIELD. ELECTRONIC DRIVER <20% TOTAL	L9-18 LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-18-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-18-18-SOF-C1-40K9-D035-D01-1C-UNV MARK #SL2L-LOP-18FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V	66 RECESSED 6,300 4000 80 120-277V, 2"X 18' LINEAR STRIP FIXTURE WITH FROSTED LENS AI ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH TO 1%. UL LISTED.
SL3 SL3 IITHONIA #RSX1-LED-P1-40K-R3-MVOLT-HS-SPA-DDBXD / POLE #SSA-9.5-4G-DM19AS-VD-DDBXD 70 POLE SL3A SAME AS SL3 EXCEPT WITH POLE (LUMARK) #SSA-4-M-12-W-F-*-1-F-G-V / (LITHONIA		ALUMINUM POLE ON CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER.	LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-20-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-20-20-SOF-C1-40K9-D035-D01-1C-UNV	120-277V, 2"X 20' LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH
LUMARK #PRV-C15-D-UNV-T4-SA-BZ / POLE #SSA-4-M-12-W-F-*-1-F-G-V EXO #ASL1-160L-70-4K7-4W-UNV-A-DBT / POLE HAPCO #SSA12D4-4-BM-VD-DBL NUT	,	120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH TYPE 4 DISTRIBUTION. ELECTRONIC DRIVER <20% TOTAL HARMONIC DISTORTION. UL	L9-20 MARK #SL2L-LOP-20FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V	73 RECESSED 7,000 4000 80 TO 1%. UL LISTED.
LITHONIA #RSX1-LED-P1-40K-R4-MVOLT-SPA-DDBXD / POLE #SSA-12-4G-DM19AS-VD-DDBXD 1000000000000000000000000000000000000		CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER. 120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH (2) TYPE 3 DISTRIBUTION. ELECTRONIC DRIVER <20% TOTAL HARMONIC DISTORTION. UL	LUMENWERX #VIA2R-D-HLO-FH-SW-80-350-40-30-UNV-D1-1C-DTL-W LITECONTROL #2L-PT-D-30-30-SOF-C1-40K9-D035-D01-1C-UNV	AME AS L9-20 EXCEPT WITH GENERATOR TRANSFER DEVICE 108 RECESSED 10,500 4000 80 120-277V, 2"X 30' LINEAR STRIP FIXTURE WITH FROSTED LENS AI ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH TO 1%. UL LISTED.
SL5 EXO #ASL1-160L-70-4K7-3-UNV-A-DBT / POLE HAPCO #SSA12D4-4-BM-VD-DBL NUT 140 POLE LITHONIA #RSX1-LED-P1-40K-R3-MVOLT-SPA-DDBXD / POLE #SSA-12-4G-DM28AS-VD-DDBXD 140 POLE	14,192 4000	70 LISTED. DLC QPL LISTED. ON 12FT SQUARE STRAIGHT ALUMINUM POLE ON CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER.	L3-00 MARK #SL2L-LOP-30FT-FLP-GB-80CRI-40K-350LMF-MIN1-277V LUMENWERX #VIA4R-D-HLO-FH-SW-80-750-40-4-UNV-D1-1C-DTL-W	120-277V, 4"X 4' LINEAR STRIP FIXTURE WITH FROSTED LENS AN
LUMARK #PRV-C60-D-UNV-T2-SA-BZ / POLE #SSA-4-M-20-W-F-*-1-F-G-V EXO #ASL2-320L-145-4K7-2-UNV-A-DBT / POLE HAPCO #SSA20D4-4-BM-VD-DBL-NUT LITHONIA #RSX2-LED-P3-40K-R2-MVOLT-SPA-DDBXD / POLE #SSA-20-4G-DM19AS-VD-DDBXD	20,083 4000	70 LISTED. DLC QPL LISTED. ON 20FT SQUARE STRAIGHT ALUMINUM POLE ON CONCRETE BASE.	L10-4 LITECONTROL #4L-PT-D-4-04-SOF-C1-40K9-D075-D01-1C-UNV MARK #SL4L-LOP-4FT-FLP-GB-80CRI-40K-750LMF-MIN1-277V	30 RECESSED 3,000 4000 80 HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH RANGE FR
LUMARK #PRV-C60-D-UNV-T3-SA-BZ / POLE #SSA-4-M-20-W-F-*-1-F-G-V EXO #ASL2-320L-145-4K7-3-UNV-A-DBT / POLE HAPCO #SSA20D4-4-BM-VD-DBL NUT			LUMENWERX #VIA4P-D-WDO-FH-SW-80-500-40-24-UNV-D1-1C-ACS-B LITECONTROL #4L-P-D-24-24-BAT-C5-40K9-D050-D01-1C-UNV-FA2 MARK #S4PD-LLP-24FT-MSL8-80CRI-40K-500LMF-DBW-SCT-MIN1-FLL-MVOLT-BLKT-F2/72A	104SUSPENDED12,000400080120-277V, 4"X 24' LINEAR STRIP FIXTURE WITH FROSTED LENS AI ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WIT TO 1%. UL LISTED.
SL7 LITHONIA #RSX2-LED-P3-40K-R3-MVOLT-SPA-DDBXD / POLE #SSA-20-4G-DM19AS-VD-DDBXD 153 POLE LUMARK #PRV-C60-D-UNV-T4-SA-BZ / POLE #SSA-4-M-20-W-F-*-1-F-G-V LUMARK #PRV-C60-D-UNV-T4-SA-BZ / POLE #SSA-4-M-20-W-F-*-1-F-G-V 153 POLE	20,050 4000	70 CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER. 120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH TYPE 4	LUMENWERX #VIA4P-D-WDO-FH-SW-80-500-40-36-UNV-D1-1C-ACS-B LITECONTROL #4L-P-D-36-36-BAT-C5-40K9-D050-D01-1C-UNV-FA2	120-277V, 4"X 36' LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WITH TO 1%. UL LISTED.
EXO #ASI 2-3201 -145-4K7-4W-UNV-A-DBT / POLE HAPCO #SSA20D4-4-BM-VD-DBL NUT	19,984 4000		L11-36 MARK #S4PD-LLP-36FT-MSL8-80CRI-40K-500LMF-DBW-SCT-MIN1-FLL-MVOLT-BLKT-F2/72A LUMENWERX #VIA4P-D-WDO-FH-SW-80-500-40-48-UNV-D1-1C-ACS-B	120-277V, 4"X 48' LINEAR STRIP FIXTURE WITH FROSTED LENS A
LUMARK #PRV-C60-D-UNV-T4-SA-BZ / POLE #SSA-4-M-20-W-F-*-2-F-G-V (TWIN@180DEG) EXO #ASL2-320L-145-4K7-4W-UNV-A-DBT / POLE HAPCO #SSA20D4-4-BM-VD-DBL NUT LITHONIA #RSX2-LED-P3-40K-R4-MVOLT-SPA-DDBXD / POLE #SSA-20-4G-DM28AS-VD-DDBXD	39,968 4000		L11-48 LITECONTROL #4L-P-D-48-48-BAT-C5-40K9-D050-D01-1C-UNV-FA2 MARK #S4PD-LLP-48FT-MSL8-80CRI-40K-500LMF-DBW-SCT-MIN1-FLL-MVOLT-BLKT-F2/72A	207 SUSPENDED 24,000 4000 80 ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING DRIVER WIT
LUMARK #PRV-C60-D-UNV-T4-SA-BZ / POLE #SSA-4-M-20-W-F-*-2-F-G-V (TWIN@90DEG) EXO #ASL2-320L-145-4K7-4W-UNV-A-DBT / POLE HAPCO #SSA20D4-4-BM-VD-DBL NUT		VERIFY COLOR PRIOR TO PLACING ORDER. 120/277-VOLT, 4000K CCT L.E.D., POLE MOUNTED FIXTURE WITH (2) TYPE 4 DISTRIBUTION. ELECTRONIC DRIVER <20% TOTAL HARMONIC DISTORTION. UL	L12-52 L1	229 SUSPENDED 26,000 4000 80 120-277V, 4"X 52' ASYMMETRIC LINEAR STRIP FIXTURE WITH FRO EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING FROM 100% TO 1%. UL LISTED.
SL10 LITHONIA #RSX2-LED-P3-40K-R4-MVOLT-SPA-DDBXD / POLE #SSA-20-4G-DM29AS-VD-DDBXD 306 POLE	39,968 4000	CONCRETE BASE. VERIFY COLOR PRIOR TO PLACING ORDER.	LUMENWERX #VIA4P-D-ARO2-FH-SW-80-500-40-64-UNV-D1-1C-ACS-B	120-277V, 4"X 64' ASYMETRIC LINEAR STRIP FIXTURE WITH FROS EXTRUDED ALUMINUM HOUSING. ELECTRONIC 0-10V DIMMING
INVUE #VFS-K-B40-7-LED-480-TS-SG-ST-18 LUMARK #NFFLD-S-C15-D-480-33-BZ-ST-BZ LIGMAN #FS-UOD-50172-N-W40-480V-A54531-US01-TS1-US2312044-XX	6,070 4000		L12-64 L12-64 L12-64 L12-64FT-MSL8-80CRI-40K-500LMF-WW-SCT-MIN1-FLL-MVOLT-BLKT-F2/72A	282 SUSPENDED 32,000 4000 80 FROM 100% TO 1%. UL LISTED.
SURE LITE #LPX-7-SD 1 UNIVERS EX1 1 UNIVERS	SAL	120-277V, WHITE POLYCARBONATE SELF POWERED EXIT SIGN WITH RED LETTERS AND NICKEL CADMIUM BATTERY. EXIT SIGN SHALL HAVE SELF DIAGNOSTIC. UL LISTED	LUMENWERX #VIA2P-DI-HLO-FH-TIO-SW-80-350-200-40-10-UNV-D1-1C-ACS-W LITECONTROL #2L-P-ID-STD-10-10-SOF-C1-40K9-I030-D030-D01-1C-UNV-FA1 MARK #S2PID-LLP-10FT-MSL8-80CRI-40K-300LMF-I80CRI-I40K-I300LMF-SCT-MIN1-FLL-MVOLT-	-WHTT-F1/36A 50 SUSPENDED 5,500 4000 80 120-277V, 2"X 10" LINEAR STRIP FIXTURE WITH FROSTED LENS AN ALUMINUM HOUSING WITH UP AND DOWN LIGHTING. ELECTRON DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED.
EX1 DUAL LITE #EVE-U-R-W-E-I REMARKS:			LUMENWERX #VIA2PPAT-DI-HLO-1.0D-TIO-SW-80-350-200-40-16'(4'X4'X4'X4')-4LEV2C(90)-D1-10 LITECONTROL #	LENS AND EXTRUDED ALUMINUM HOUSING WITH UP AND DOWN
$\left\{ \right\}$			L14 MARK # LUMENWERX #VIA2PPAT-DI-HLO-1.0D-TIO-SW-80-350-200-40-16'(8'X8')-1LEV2C(90)-D1-1C-ACS	
			L14-16	79 SUSPENDED 8,800 4000 80 BIMMING DRIVER WITH RANGE FROM 100% TO 1%. UL LISTED.
$\sum_{i=1}^{n}$			LUMENWERX #VIA2PPAT-DI-HLO-1.0D-TIO-SW-80-350-200-40-100'(24'X28'X28'X20')-3LEV2C(90)	FIXTURE WITH FROSTED LENS AND EXTRUDED ALUMINUM HOUS
$\left\{ \right.$			L15-100 LITECONTROL # MARK #	494 SUSPENDED 55,000 4000 80 DOWN LIGHTING. ELECTRONIC 0-10V DIMMING DRIVER WITH RA 1%. UL LISTED.
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PLAN NOTES 1. CONNECT SITE LIGHTING TO CIRCUIT H3-13(15) WIRED THROUGH LIGHTING CONTACTOR LC2 IN ELECTRICAL ROOM 045 USING 1"C, 3-#8, #10 GROUND. LOCATE CONTACTOR ON WALL NEXT TO PANEL H3. SEE SITE LIGHTING DETAIL FOR ADDITIONAL 2. CONNECT SITE LIGHTING TO CIRCUIT H2-13(15) WIRED THROUGH LIGHTING CONTACTOR LC3 IN IT/ELECTRICAL ROOM 106 USING 1"C, 3-#8, #10 GROUND. LOCATE CONTACTOR ON WALL NEXT TO PANEL H2. SEE SITE LIGHTING DETAIL FOR ADDITIONAL WORK. 3. CONNECT SITE LIGHTING TO CIRCUIT H1-15(17) WIRED THROUGH LIGHTING CONTACTOR LC4 IN ELECTRICAL ROOM 061 USING 1"C, 3-#8, #10 GROUND. LOCATE CONTACTOR ON SOUTH WALL. SEE SITE LIGHTING DETAIL FOR ADDITIONAL WORK. 4. CONNECT SITE SIGN TO CIRCUIT H3-17(19) WIRED THROUGH LIGHTING CONTACTOR LC5 IN ELECTRICAL ROOM 045 USING 1"C, 3-#6, #10 GROUND. LOCATE CONTACTOR ON SOUTH WALL. SEE SITE LIGHTING DETAIL FOR ADDITIONAL WORK. 5. EXTEND POWER AND CONTROL CIRCUITS FOR GENERATOR. SEE SHEET E-501, DISTRIBUTION RISER DIAGRAM FOR WIRING AND CONTROL INFORMATION. COORDINATE CONTROL WIRING WITH GENERATOR PROVIDER. 6. PROVIDE AND INSTALL CONCRETE PAD FOR GENERATOR. SEE PAD DETAIL FOR REQUIREMENTS. 7. PROVIDE AND INSTALL CONCRETE PAD FOR UTILITY TRANSFORMER PER LOCAL UTILITY COMPANY SPECIFICATIONS. 8. PROVIDE AND INSTALL SERVICE CONDUITS AND CONDUCTORS FROM UTILITY COMPANY TRANSFORMER TO CT/METER CABINET TO MAIN DISTRIBUTION PANEL (MDP). SEE SHEET E-501, DISTRIBUTION RISER DIAGRAM AND SPECIFICATIONS FOR WIRING REQUIREMENTS. 9. PROVIDE AND INSTALL NEC GROUNDING TRIAD WITH GROUND CONDUCTOR TO SERVICE ENTRANCE GROUND BUS IN ELECTRICAL ROOM 061. SEE SPECIFICATIONS AND DETAILS. (10. PROVIDE AND INSTALL 2"C TO HANDHOLE AT SIGN PANEL SUPPORT FRAME. PROVIDE AND INSTALL HANDHOLES. 11. PROVIDE AND INSTALL COMMUNICATIONS HANDHOLE WITH (2) 2"C TO IDF ROOM 035. STUB UP 6" ABOVE FLOOR ALONG EAST 12. PROVIDE AND INSTALL COMMUNICATIONS HANDHOLE WITH (2) 3"C TO MDF ROOM 093. STUB UP 6" ABOVE FLOOR ALONG 13. PROVIDE AND INSTALL COMMUNICATIONS HANDHOLE WITH (2) 2"C TO IDF/ELECTRICAL ROOM 106. STUB UP 6" ABOVE FLOOR ALONG WEST WALL. 14. PROVIDE AND INSTALL 2"C, 3-#6, 1-#10 GROUND POWER SUPPLY FROM PANEL H3-17(19) THROUGH LC2 IN ELECTRICAL ROOM 045 TO SIGN PANEL. SEE POWER DIAGRAM ON E-501. MOUNT SIGN PANEL, DISCONNECT SWITCH AND TRANSFORMER T-SIGN ON GALVANIZED STRUT FRAME ON (2) 4" GALVANIZED POSTS IN CONCRETE FOUNDATIONS. COORDINATE FINAL LOCATION ON

12	13	14	15	16	17	













