ADDENDUM No. 1

RFP No. 24-57

Ann Arbor Fire Station 4

Updated Due Date/Time: December 17, 2024 at 2:00 P.M. (local time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any) and is appended thereto. **This Addendum includes one hundred and thirty-six (136) pages.**

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgement of receipt of this addendum may be considered non-conforming.

The following forms provided within the RFP Document should be included in the submitted proposal:

- **Attachment B – General Declarations**
- **Attachment D – Prevailing Wage Declaration of Compliance**
- **Attachment E - City of Ann Arbor Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - City of Ann Arbor Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these completed forms listed above upon proposal opening may be rejected as non-responsive and may not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the RFP documents which are included here in are referenced to a page or Section in which they appear conspicuously. Offerors are to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	Change
All mentions	As provided in RFP No. 24-57 Document: Proposal Due Date: December 4, 2024 at 2:00 p.m. (local time) As updated herein: Proposal Due Date: December 17, 2024 at 2:00 p.m. (local time)

Comment: The Due Date and Time for responses to this RFP has been extended to as outlined above. Note that all other dates are unchanged.

II. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the RFP. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

Question 1: Drawing A3.12/Detail 1 calls for an allowance for public art. Please provide a dollar value for all bidders to include for this.

Drawing A3.12, detail 1, includes Public "Art Wall" at the west elevation of the building, the note refers to an allowance. Clarify if this work is owner furnished, or contractor furnished. If contractor furnished, provide allowance to be included with bid proposal. This is a specialty item and will eliminate variances in cost included in bid proposals.

Answer 1: The public art element is not expected to be included the bid proposal. Public art is a required element to this project, and the winning contractor will be expected to work with the City of Ann Arbor with this project. Costs to the contractor will be separate from this bid price and will be negotiated with the contractor.

Question 2: As I compare my table of contents to the pages of the drawings it seems I am missing some. Missing: C6.2, A3.42, A3.43, A3.44, A4.17, A4.18.

The Architectural Plans start at A2.11. Just confirming we are not missing an plans in the A1.00 range.

Answer 2: A6.2, A4.17 and A4.18 are no longer in the drawing sets and were not issued in Bid/Permit sets. A3.42, A3.42 and A3.44 are included in Addendum #1.

Question 3: For the window shades specification section 122400 on the Ann Arbor Fire Station 4 project there are no roller shade manufacturers listed, only a basis of design of Draper roller shades. Would it be acceptable for us to provide a quote for Creative Windows' OpenLight roller shades in lieu of Draper? We are able to provide the specified fabrics and also the light gap reduction channels for the blackout shades so there is no deviation from intent of spec if you approve our product.

Also, window shade spec section lists both fascia and exposed headbox as top treatments (see spec section 122400 2.01 B 5). These are conflicting as only one can be used at a time. Fascia is an approx. 4" L shaped aluminum extrusion which has to be surface mounted and covers only the inside face and part of the bottom of the shade from view. Exposed headbox is a 5" x 5" U shaped aluminum extrusion that can be either surface or recess mounted and covers both the front, top, and back of the shade. Exposed headbox typically comes with a piece of closure that is detachable and covers a portion of the bottom of the shade. I've attached drawings of each scenario. Can you clarify what top treatment you would like us to provide?

Answer 3: Provide headbox, as indicated in spec section 12 2400, paragraph 2.01(B)(2)(a). Disregard paragraph 2.01(B)(5)(c). Substitutions meeting the requirements of Section 01 6000 Product Requirements will be considered.

Question 4: Drawing C-3.0 indicates that a proposed pole & traffic signal are required. Please clarify if this work is not part of this bid package and will be future work.

Answer 4: Drawing C-3.0 proposed pole and traffic signal are required and part of this bid package. Drawings will be provided in future Addendum.

Question 5: Drawing E0.03 Construction key notes # 2 indicates to provide cost for alternate transformer pad. Please clarify size and thickness.

Answer 5: Coordinate size of transformer with DTE and follow DTE standards for transformer pad sizing and thickness.

Question 6: Specification section 02 4100 Demolition, page 2, section 3.01 Demolition, item G and section 3.02 General Procedures and Project Conditions, item H, indicate removal of underground storage tanks and refers to section 02 6500 not included in specifications. Please clarify tank's location, quantity, sizes, and type of tanks to be removed. Also, include section 02 6500, as required.

Answer 6: This was boilerplate language. We are unaware of any underground tanks at this location.

Question 7: General Conditions, Section 25 paragraph one references builders risk insurance and advises that the contractor obtain builders risk insurance. Please clarify if the owner requires builders risk insurance to be included by the contractor?

Answer 7: Please reference Section 28 for insurance requirements.

Question 8: Section I - General Information, Item U: Major Subcontractors, indicates that bidder shall identify major subcontractors that are 15% or more of the bid sum or over $50,000. Does this mean that a list of major subcontractors shall be included with the bid proposal?

Answer 8: Yes, major subcontractors that are 15% or more of the bid sum or over $50,000 need to be included in bid proposal.

Question 9: Can a traffic control plan for the proposed ROW construction. Do the bidding contractors need to assume lane/time restrictions for work within the ROW?

Answer 9: There will very likely be time restrictions for work within the ROW. This question should be directed to the City. The City will likely comment on this as part of their engineering review of the site construction plans as well.

Question 10: Will a pedestrian detour be required? If required, please provide the proposed route, and required signage.

Answer 10: The City will likely require a pedestrian detour. This has not been designed yet, but if required by the City this will be designed with revisions addressing any City engineering comments.

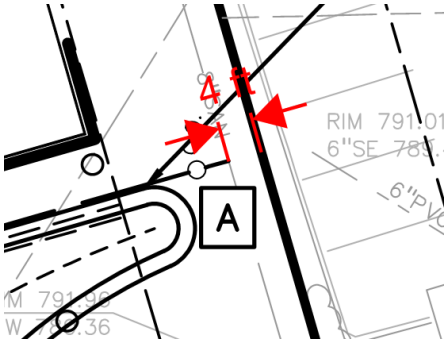
Question 11: The existing 2" water service is called for removal from the building to the connection on the existing hydrant lead. Please confirm how it is to be abandoned at the main. Will closing the corporation and disconnecting the 2" lead at the main or complete removal of the existing corporation with a new piece of DI pipe will be required? C2.0

Answer 11: Complete removal of the connection and a new piece of 6" ductile iron pipe to replace the connection should be used.

Question 12: The existing sanitary sewer connection is called to be removed. Please state if the contractor can cap the lead at the main or complete removal of the existing "wye/tee" will be required?

Answer 12: Complete removal of the wye/tee and replacement with new pipe will be required.

Question 13: The existing sewer lead connection and proposed sanitary sewer lead connection is approximately 11' deep and 4' from the property line. The excavation required to perform this work will require excavation and pavement removal on the neighboring property. Please confirm this work will be allowed.



Answer 13: The City has required an easement over the existing sanitary sewer and will have to work with the property owner to acquire this easement. If the connection cannot be constructed without excavation onto the adjacent property, the City may have to coordinate with the adjacent property owner for this work at the same time they negotiate the easement acquisition.

Question 14: The sanitary sewer connection calls for an 8"x6" wye to be installed. It is my understanding that all taps to an existing sanitary/storm sewer are required to be performed by the City of Ann Arbor. Please confirm the contractor is to perform this work and not the City of Ann Arbor. If the City will be making the tap will the fees be waived? If the fees are not waived what is the cost?

Answer 14: We believe the City only completes water taps, not sanitary sewer taps.

Question 15: Sheet C-6.1 calls for the water material to be C909 and water main note 6 on sheet C8.0 notes the material to be CL54 ductile iron pipe. The standard water main material per the 2024 city specifications is DI PC 350. Please confirm the water main pipe material to be used for this project.

Answer 15: The water main pipe will be Class 54 ductile iron pipe; the notes will be coordinated.

Question 16: Will tracer wire be required for the new water main?

Answer 16: Per City of Ann Arbor specifications, tracer wire is required.

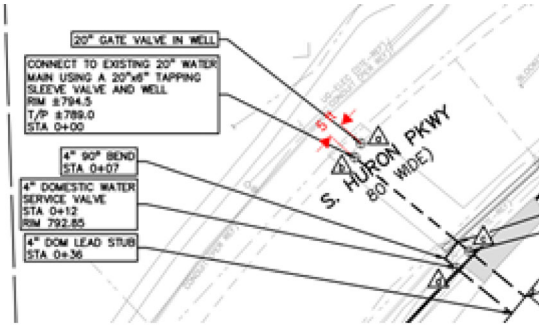
Question 17: Will Anode bags be required at the connection to the existing water main?

Answer 17: Sacrificial anodes should be placed as required by City of Ann Arbor specifications and at the direction of the City.

Question 18: What is the existing 20" water main material? Is as built information available for an approximate depth?

Answer 18: City records indicate the main is ductile iron. As-built information was not available when requested from the City.

Question 19: Sheet C-6.1shows a 20" Gate Valve and Well to be installed on the existing line and a 20"x6" tapping sleeve valve and well to be installed 5' apart. There is not enough space to perform the work as shown due to the size of the wells. Please verify the location of the tapping valve in relation to the 20" valve. Is a tapping valve necessary since the 20" valve will be cut in?



Answer 19: Conversations with the City have resulted in a change for the connection. It will be installed as a cut in tee with the 6" gate valve approximately 5' from the tee.

Question 20: Please confirm if the 20" valve is to be a Gate Valve or Butterfly valve.
Answer 20: Butterfly valve, per City of Ann Arbor specifications.

Question 21: Are the proposed 6" service valve and 4" domestic valve in a box or well?
Answer 21: These valves should be in boxes.

Question 22: The storm manhole detail calls for a booted connection while the other storm structure details do not. Please confirm if and what storm structures will require a booted connection?
Answer 22: All the manhole structures and outlet control structure 41 should include booted connections.

Question 23: Will the storm sewer require post construction video inspection?
Answer 23: The contractor is responsible for all permitting and inspections.

Question 24: Will the plumbing department or the engineering department inspect the proposed sanitary sewer external to the building?
Answer 24: The contractor is responsible for all permitting and inspections.

Question 25 Please confirm the bedding material for the proposed 6" PVC Sanitary sewer outside of the building. Are we to follow SD-TD-2?
Answer 25: Yes, SD-TD-2 will be used for all sanitary sewer.

Question 26: Please confirm if the 4" water service in the civil plans is to be stubbed outside of the building or brought into the building with a riser/flange connection?
Answer 26: The 4" domestic water service is to be brought into the building with a riser/flange connection; *see mechanical/plumbing drawings.*

Question 27: It was noted in the preconstruction meeting signal work is to be included. The plans only note "signal plans to be included in the final design." Can signal plans please be made available?
Answer 27: Drawings to be issued in an Addendum. Currently the signal designer's anticipated completion is the week of November 18.

Question 28: Are the architectural plans for the existing fire station available to assist in pricing the demolition work?

Answer 28: Plans have been attached. These plans are original and do not include some interior bathroom renovations in 2016.

Question 29: Per specification section 230933 2.01-B the approved temperature control contractor is Automated Logic, please confirm if they are the only approved TCC for this job.

Answer 29: Specification should also include Metro Controls of Clinton Township under section 2.01.B.1

Question 30: Section 12 2400 Window Shades, part 2 products, section 2.01 Roller Shades, 5c and 5d include extruded aluminum finish for exposed headbox and finish for extruded aluminum fascia accessory. Please clarify which is required finished headbox or finished fascia.

Answer 30: Please refer to response to question number 3.

Question 31: Section 12 2400 Window Shades, Part 2, section 2.02 Shade Fabric, item A.1.a Verona Twilight -0% is no longer available, per contractor. Please include optional manufacturer for base bid shade fabric. Contractor suggestion Sparts Twilight -0%. Also, please clarify color of shades.

Answer 31: Substitutions meeting the requirements of Section 01 6000 Product Requirements will be considered. Color to be selected by the Architect from the manufacturer's full range.

Question 32: Please provide the location of the sanitary napkin dispenser and receptacle unit...and PLEASE ADVISE on a model number if possible, for this surface-mounted unit.

Answer 32: Please provide one sanitary napkin disposal unit for each of two rooms (Staff Restroom 108T & 103T Public Restroom). American Specialties, Inc. Model No. 0852. Substitutions meeting the requirements of Section 01 6000 Product Requirements will be considered. Spec section 10 2800 is reissued with this addendum.

Question 33: A3.12 calls for a "PERFORATED METAL PANEL TRANSPIRED SOLAR COLLECTOR - PROVIDE ALL NECESSARY CLOSURES – BLACK", Please confirm this is part of the HVAC system and has nothing to do with the electrical systems. It is assumed it is as follows – A perforated metal panel transpired solar collector (TSC) is a solar heating and ventilation system that uses a dark-colored, perforated metal wall to capture solar energy and heat the air inside a building through a fan in the ducting system.

Answer 33: This is correct. It has nothing to do with the electrical system.

Question 34: Site Lighting – Nothing shown?

Answer 34: To be determined. If providing drawings to be issued in an Addendum.

Question 35: Interior Lighting – Per specification only or are similar alternates allowed?

Answer 35: Similar Alternates are allowed.

Question 36: Solar Panel calls out for Jinko 460W Panels – Alternates allowed?

Answer 36: Alternates allowed provided overall design meets similar or greater production.

Question 37: Solar Inverter calls out for Chint Inverter – Alternates allowed?

Answer 37: Alternates allowed provided overall design meets similar or greater production.

Question 38: EV Conduits call out for (4). Confirm (1) Installed now and (3) Future provisions. (2) on each side of the parking lot?
Answer 38: Correct, 4 conduits to be installed for (1) EV charger being installed during project and (3) future EV chargers.

Question 39: EV Conduits call out for (4). Confirm (1) Installed now and (3) Future provisions. (2) on each side of the parking lot?
Answer 39: Correct, 4 conduits to be installed for (1) EV charger being installed during project and (3) future EV chargers.

Question 40: Generator calls for propane – Alternate for diesel allowed for cost savings?
Answer 40: No. Propane is required.

Question 41: Camera System – By others? Assumed the City of Ann Arbor has it's own contractor?
Answer 41: The City of Ann Arbor uses Ocularis Video Management System (VMS). Licensing and cameras are purchased through Presidio.

Question 42: Access Control System – By others? Assumed the City of Ann Arbor has it's own contractor?
Answer 42: The City of Ann Arbor uses Avigilon Access Control Manager (ACM) for all doors and gates. This is also purchased through Presidio who also supports the system.

Question 43: Fire Alarm System – By others? Assumed the City of Ann Arbor has it's own contractor?
Answer 43: Notifier by Honeywell

Question 44: Can the RFI date be extended 11/18/2024 for better review of the plans
Answer 44: No

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

A3C COLLABORATIVE ARCHITECTURE

Project Name: Ann Arbor Fire Station #4
A3C Project No: 21018

ADDENDUM #1

Date: 11/11/2024

Owner: City of Ann Arbor Fire Department
111 North Fifth Ave.
Ann Arbor, MI 48104-1405

Architect: A3C - Collaborative Architecture
115 1/2 E. Liberty
Ann Arbor, MI 48104

This addendum modifies, corrects and/or supplements the drawings and specifications for the project, and is hereby made a part of the contract documents. All bidding contractors shall note all changes in the work represented in this Addendum, and include said changes in their bid. The bidding contractors shall acknowledge receipt and implementation of this Addendum into their bids on the Bid Form, as contained within the Project Manual.

Unless otherwise noted, all materials, workmanship, and services shall be the same as called for in the original documents. Where changes are made in construction, such changes shall take into account the work of all required adjustments made necessary by such changes, whether or not each and every item is specifically enumerated.

Supplements:
Supplemental Drawings G0.02, C-8.2, A2.11, A2.21, A2.22, A3.42, A3.43, A3.44, A4.13, A6.21, A6.22, A7.13, A8.11, A8.12, S5.04, M0.01, M4.01, M6.04, P2.01, P2.03, P5.01 and E3.01 dated as being revised November 11, 2024, are attached to supplement this Addendum.

Supplemental Specifications 028213, 102800, 129300, 221119, 230933, 321313, 321723, 329200, 329300 and 329320, dated as being revised November 11, 2024, are attached to and supplement this Addendum.

Specifications revised but not reissued as part of this Addendum are as follows:
057311 – Decorative Metal and Glazed Metal Railings – VIVA

Supplemental Asbestos Report (attached with specification)

Supplemental Pre-Proposal sign-in sheet (attached)

Architectural Drawing Clarifications:

Item 1: Revise Drawing G0.02 – Sheet Index, as follows:
- a. Revised drawing index for Addendum #1.
- b. Add sheet L-08 Basketball Court Details Alternate #1 (was in set but not index).

Item 2: Revise Drawing A2.11 – First Level Floor Plan, as follows:
- a. Revise swing of doors 104A and 123B.
- b. Revise door sizes for 123A and 123B.
- c. Change wall types in Compressor 120.

Item 3: Revise Drawing A2.21 – Door Schedule, Door & Frame Types, as follows:
- a. Revise door sizes for 123A and 123B.
- b. Add "T" tempered to door type E.

Item 4: Revise Drawing A2.22 – Interior Door & Window Details, as follows:
- a. Add sealant to detail 9.
- b. Revise detail 12 to show air/moisture barrier lapping over metal drip edge leg.

Item 5: Add Drawing A3.42 – Exterior Details, as follows:
- a. Drawing was not included in the Bid-Permit set. Re-issued in Addendum #1.

Item 6: Add Drawing A3.43 – Exterior Details, as follows:
- a. Drawing was not included in the Bid-Permit set. Re-issued in Addendum #1.

Item 7: Add Drawing A3.44 – Exterior Details, as follows:
- b. Drawing was not included in the Bid-Permit set. Re-issued in Addendum #1.

Item 8: Revise Drawing A4.13 - Interior Elevations, as follows:
- a. Revised detail 10. Remove upper shelf and make lower larger.

Item 9: Revise Drawing A6.21 – Ceiling Details, as follows:
- a. Revised detail 3. Change ceiling height.

Item 10: Revise Drawing A6.22 – Ceiling Details, as follows:
- a. Revise detail 2. Show structure attachment above.

Item 11: Revise Drawing A7.13 – Stair & Elevator Details, as follows:
- a. Revise detail 1 at stair opening edge.
- b. Revise detail 5. Add note to see finish schedule for finishes.

Item 12: Revise Drawing A8.11 – Casework Details, as follows:
- a. Revise detail 4. Show grommets and flexible conduit.

Item 13: Revise Drawing A8.12 – Interior Finish Details, as follows:
- a. Revise detail 5. Show stainless steel trim instead of PVC trim.
- b. Revise detail 9. Show sill sealer.
- c. Revise detail 10. Remove splashguard and replace with marble threshold.

Architectural Specification Clarifications:

Item 1: Added specification section 028213 – Asbestos Remediation with survey

Item 2: Revise specification section 057311 – Decorative Metal and Glazed Metal Railings – VIVA Revised but not reissued
- a. Revise section 2.01 Manufacturer B. Substitutions: Not Permitted
- b. To read B. Substitutions: See Section 016000 – Product Requirements.

Item 3: Revised specification section 102800 – Toilet, Bath, and Laundry Accessories
- a. Added Sanitary Napkin Disposal Unit information.

Landscape Specification Clarifications:

Item 1: Add specification section 129300 – Site Furnishings (attached)
- a. Re-issued due to printing issue.

Item 2: Add specification section 321313 – Post Tensioned Concrete Court (attached)
- a. Re-issued due to printing issue.

Item 3: Add specification section 321723 – Pavement Markings (attached)
- a. Re-issued due to printing issue.

Item 4: Add specification section 329200 – Fine Grading and Lawn Seeding (attached)
- a. Re-issued due to printing issue.

Item 5: Add specification section 329300 – Plants (attached)
- a. Re-issued due to printing issue.

Item 6: Add specification section 329320 – Plant Maintenance and Guarantee Period (attached)
- a. Re-issued due to printing issue.

Civil Drawing Clarifications:

Item 1: Revise Drawing C-8.2 – Details, as follows:
- a. Revise heavy duty concrete detail. Add reinforcing to slab.

Structural Drawing Clarifications:

Item 1: Revise Drawing S5.04 – Typical Details, as follows:
- a. Add steel for support of fire pole.

Mechanical Drawing Clarifications:

Item 1: Revise Drawing M0.01 – Mechanical Standards and Drawing Index
- a. Added 'RFH ROOF HYDRANT' to the Mechanical Abbreviation List.

Item 2: Revise Drawing M4.01 – First Level Sheet Metal Plan, as follows:
- a. Removed two return grilles and replaced them with acoustic transfer ducts.

Item 3: Revise Drawing M6.04 – Mechanical Details
- a. Added transfer duct details.

Item 4: Revise Drawing P2.01 – First Level Plumbing Plan
- a. Added cold water fee for roof hydrant for low roof at By Toilet 126T.
- b. Added Construction Key Note #36.

Item 5: Revise Drawing P2.03 – Roof Plumbing Plan, as follows:
- a. Added roof hydrants at low and high roofs.

Item 6: Revise Drawing P5.01 – Enlarged Plumbing Plans
- a. Added cold water feed for roof hydrant for high roof at Custodial 202 on Second Level Enlarged Plumbing Plan.
- b. Added Construction Key Note #11.

Mechanical Specification Clarifications:

Item 1: Revised specification section 230933 – Temperature Controls
- a. Add line 2.01.B.1.b: "Metro Controls, Inc. (Clinton, Twp, MI)."

Plumbing Specification Clarifications:

Item 1: Revised specification section 221119 – Domestic Water Piping Specialties

b. Added Part 2.10 Roof Hydrants.

Electrical Drawing Clarifications:

Item 1: Revise Drawing E3.01 – First Level Power Plan, as follows:

a. Corrected wording of overhead door to be four-fold doors.

b. Corrected location of four-fold door controllers at central pedestals

c. Corrected location of four-fold door motors.

End of Addendum #1

ASBESTOS REMEDIATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes removal and disposal of asbestos-containing materials by full enclosure, glove bag, or entire structures methods as applicable. Demolition and debris removal of all asbestos-containing materials identified by provisions of this Section, or shown on drawings, or identified at the site, shall be executed under the provisions of this Section, and other applicable sections of these specifications.

B. Extent of asbestos removal work is as follows:

1. Indicated on drawings.
2. Surveyed and listed in "Schedule of Items Containing Asbestos" Article in Part 3 of this Section.

1.2 DEFINITIONS

A. Asbestos Abatement Firm: Firm engaged to perform actual removal and disposal work, either as Contractor or subcontractor.

B. Asbestos Containing Material: The term "asbestos containing material" is abbreviated ACM.

C. Owner's Consultant: Firm engaged by Owner to identify and measure asbestos containing materials, or to inspect demolition operations, including monitoring of air quality.

1.3 SUBMITTALS

A. Initial Submittals: Submit the following documents to Owner's Representative at the pre-abatement meeting:

1. License from the State of Michigan in accordance with Act 135 P.A. 1986 (Asbestos Abatement Contractors Licensing Act).
2. Copy of notification sent to appropriate federal, state, and local agencies.
3. Schedule of removal, specifying work locations, length and number of shifts, foreman's name, and crew size.

B. Waste Disposition Submittals: Submit to owner signed waste shipment record stating that asbestos waste has been properly disposed. Submit the following:

1. Receipts (trip tickets) from approved landfill.
2. Asbestos Waste Shipment Record: As follows:
    1. Prior to removing asbestos-containing material from the project site, provide Owner's Representative or Owner's consultant with a completed waste shipment record fully complying with Section 61.150 of the NESHAP standard, and 49 CFR Part 172.200 of the U.S. Department of Transportation, and including all required information.
    2. Ensure that the landfill operator provides a signed copy of the waste shipment record to owner within 35 days of the date that asbestos-containing material is removed from the project site. If waste is not transported directly from the project site to the landfill, the waste shipment record shall reflect each transfer.
    3. The Owner will not make final payment prior to receipt of signed waste shipment record.

1.4 QUALITY ASSURANCE

A. Engage one of the following firms to perform abatement of asbestos containing materials:

1. Adrian Environmental, LLC
2. Building Decommission Services, Inc.
3. Certified Abatement Services, Inc.
4. Environmental Maintenance Engineers, Inc.
5. Environmental Specialty Services, Inc.
6. Great Lakes Environmental Service, Inc.
7. MIS Corporation-Michigan
8. Next Generation Environmental, Inc.
9. Pro-Tech Environmental, Inc.
10. Professional Thermal Systems, Inc.
11. Qualified Abatement Services, Inc.
12. Quality Environmental Services, Inc.
13. Sloan Environmental Services, Inc.
14. Trust Thermal Abatement, Inc.

B. Regulatory Requirements: Make all necessary notifications to the appropriate federal, state, and local agencies.

1. The National Emission Standards for Hazardous Air Pollutants (NESHAP), Asbestos regulation 40 CFR 61, Sub-Part M requires that if at least 80 lin. meters (260 lin. ft.) of friable asbestos materials, at least 15 sq. meters (160 square feet), or 1 cu. meter (35 cu. ft.) of friable asbestos materials, or other facility components are stripped or removed while renovating a facility, all the requirements of section 61.147 apply.
2. When applicable, notify the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Michigan Department of Licensing and Regulatory Affairs (MDLARA), and appropriate state and local regulatory agencies. No work shall be conducted without notification of authorities having jurisdiction.

C. Pre-Abatement Meeting: Approximately 2 weeks prior to scheduled start of the abatement project, the Owner's Representative will hold a pre-abatement meeting with the individuals indicated below:

1. Contractor representative.
2. Asbestos Abatement Firm's representative.
3. Owner's consultant.
4. Owner's Representative.
5. Owner's building maintenance personnel.

D. The meeting agenda will include:

1. Review of the scope of work.
2. Removal methods to be used.
3. Review of Contractor's initial submittals.
4. A walk-through survey of the site, if appropriate.

E. For small projects, the meeting may be suspended at the discretion of the Owner's Representative. If the meeting is suspended, deliver required initial submittals to the Owner's Representative's office 2 weeks prior to the start of work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ASBESTOS ABATEMENT, GENERAL

A. Conduct asbestos abatement operations in a manner that fully protects Contractor's and subcontractor's employees, the general public, and building occupants from exposure to asbestos and other safety and health hazards.

1. Asbestos abatement projects shall be directly supervised by a competent person as described in 29 CFR 1926.1101.
2. The supervisor/competent person must complete responsibility checklists throughout all phases of the project.

B. Protect adjacent areas, materials and surfaces from damage due to demolition operations, including but not necessarily limited to the following:

1. Water damage.
2. Dirt, dust and debris.
3. Abrasion.
4. Cuts and scratches.
5. Holes from fasteners for temporary barriers.

C. All asbestos work shall be conducted within a regulated area that complies with the following requirements:

1. Post a sufficient number of signs required by 29 CFR 1926.1101 at the asbestos abatement area and at every work area entrance, so that tenants, Owner's personnel, and other contractor's employees have an opportunity to take protective measures before exposing themselves to asbestos. Place banners if necessary to secure open areas. Include information on signs indicating location and quantity of asbestos-containing material.
2. Allow only authorized, properly protected personnel to enter the regulated area. Immediately report unauthorized individuals entering the work area to Owner or the Owner's consultant.

D. When required, provide employees and inspectors authorized to enter the regulated area with protective work clothing consisting of disposable Dupont "Tyvek" (or equivalent) full body coveralls, head covers, boots, and other necessary safety gear, including a hard hat and eye protection.

E. Provide respiratory protection to employees as required by current OSHA regulations including 29CFR 1910.134 and 1926.1101.

1. Provide asbestos abatement workers with powered air purifying respirators (PAPR) with full facepiece and HEPA filters for adequate protection during asbestos material removal operations. Respiratory protection may be down-graded if negative exposure assessment indicates that less protection is required.
2. A half-face respirator or PAPR must be worn while tearing down and setting up enclosures, while glovebagging, and during pre-cleaning and post-cleaning work.
3. Do not allow respirators to be pulled away from faces while in the work area.
4. Maintain an extra PAPR unit on site at all times for the duration of the abatement project.
5. Provide full facepiece supplied-air respirators operated in pressure demand mode equipped with air auxiliary and pressure self-contained breathing apparatus or HEPA egress filters if required for measured fiber concentrations.

F. Maintain at each job site and post the following documents:

1. Copy of EGLE/MDLARA notification.
2. Employee respiratory protection program.
3. Michigan Right-To-Know poster.
4. Material Safety Data Sheet locator.
5. Company standard operating procedure.
6. This specification Section.
7. Material Safety Data Sheets for products used on job.
8. CFR 1926.1101.
9. CFR, Part 61 (NESHAP).
10. The foreman's or supervisor's Contractor/Supervisor Accreditation Certificate.
11. State of Michigan Accreditation Certificates and Medical Approval for each worker.

G. Use the following engineering controls and work practices for all asbestos abatement operations, regardless of measured exposure levels:

1. Vacuum cleaners equipped with HEPA filters to collect all asbestos-containing dust and debris.
2. Wet methods to control exposures during asbestos removal and clean-up, except where proven to be infeasible.
3. Prompt clean-up and disposal of asbestos-contaminated wastes and debris in leak-proof containers.
4. Establish a decontamination area, adjacent and connected to the regulated area, if the Project requires the removal of more than 25 lin. ft., or 10 sq. ft. of thermal systems insulation or surfacing ACM.
5. Establish an equipment area adjacent to the regulated area if the Project requires the removal of less than 25 lin. ft. or 10 sq. ft. of thermal systems insulation or surfacing ACM.

H. Do not use any of the following equipment or work practices during asbestos abatement operations, regardless of measured exposure levels:

1. High-speed abrasive disc saws not equipped with point-of-cut HEPA ventilation or HEPA filtered exhaust air enclosures.
2. Blowing with compressed air to remove asbestos-containing materials.
3. Dry sweeping, shoveling, or other dry methods to clean up asbestos-containing dust and debris.
4. Employee rotation as a means of reducing employee exposure to asbestos.

3.2 ASBESTOS REMOVAL BY FULL ENCLOSURE METHOD

A. Preparation of the Work Area: Complete the following preparation work prior to beginning asbestos removal operations:

1. Install critical barriers over each opening into the regulated area. The following requirements are in addition to, not in lieu of, other indicated surface and object protection requirements:
    1. Seal each opening between the work area and adjacent areas with not less than 2 layers of 4-mil polyethylene sheeting. Use an expanding-polyurethane foam gun to seal areas with large numbers of pipes, conduits and beams. Openings include, but are not necessarily limited to, windows, skylights, doorways, elevator hoistway openings, corridor entrances, drains, ducts, grills, grates, and diffusers.
    2. Seal intake and exhaust vents and duct seams within the regulated area with not less than 2 layers of 6-mil polyethylene sheeting.
2. HVAC System Shutdown: Owner's maintenance personnel will shut down heating, cooling, and air conditioning systems when necessary. Coordinate scheduling with Owner's personnel and provide 72 hours notice to the Owner's Representative prior to planned shut-down.

3. Protection of Surfaces and Objects: The following requirements are in addition to, not in lieu of, indicated work area sealing requirements. Cover the following surfaces and objects as follows:
    1. Protect all surfaces beneath all removal activity. Remove moveable objects from the work area, and cover fixed objects with impermeable dropcloths or plastic sheeting with edges securely sealed with tape.
    2. Cover open tanks with plywood or other solid material.
    3. Provide clean, fresh air to mechanical equipment, where required to maintain proper performance of equipment.
    4. Fully pre-clean all covered surfaces with amended water and a HEPA vacuum.
    5. Cover walls with not less than 2 layers of 4-mil polyethylene sheeting. Construct free-standing enclosure walls of not less than 6-mil polyethylene sheeting, with supports spaced not more than 3 feet o.c.
    6. Cover floors with not less than 2 layers of 6-mil polyethylene sheeting. Avoid seams where possible. If seams are necessary, overlap not less than 12 inches and tape joints. Extend sheeting 12 inches up the side walls leaving no seams at the wall and floor joint. Immediately repair punctures and leaks, and clean up seepage.
4. Cleaning: Do not use cleaning methods that raise dust, such as sweeping or using vacuum cleaners not equipped with HEPA filters. Do not disturb asbestos materials during pre-cleaning phases.
    1. Treat water removed from the enclosure as asbestos contaminated waste. Fully seal floor drains.
5. Deactivate or install ground-fault circuit interrupters on each electrical circuit within the enclosure.
6. Construct a three-chambered decontamination facility that is adjacent to and connected to the regulated area, and that consists of a dirty room, a shower room, and a clean room in series. Construct decontamination facilities that are exposed to weather of lumber and exterior grade plywood. Secure the facility when not in use.
    1) Supply the equipment room with properly labeled, impermeable bags and containers for the containment and disposal of contaminated protective equipment.
    2) Construct showers that comply with the requirements of 29 CFR 1910.141 (d) (3), with the shower room adjacent to both the equipment room and the clean room. Filter water waste and shower water through a 5 micron filter, or remove water from site as asbestos waste.
    3) Equip the clean room with a locker or appropriate storage container for each employee.
7. Employee Decontamination Facilities: Comply with the following requirements:
    1. Access the work area only through an approved decontamination system. Lock or block other entrances. Seal emergency exits (for use during a fire or accident) with polyethylene sheeting and tape.
    2. Seal the waste pass-out, except during the removal of asbestos waste from the enclosure.
    3. Entrance To The Regulated Area: Employees shall enter the decontamination area through the clean room, remove and store clothing, and put on protective clothing and respiratory protection before passing through to the equipment room.
    4. Exit From The Regulated Area: Employees shall exit the regulated area by removing gross contamination and debris from their protective clothing. The clothing shall be removed and disposed of in the equipment room into labeled impermeable bags or containers. Employees shall then shower and enter the clean room before changing into street clothes.

8. Local Exhaust Ventilation: Maintain portable air filtration units with a HEPA filter in use during asbestos abatement operations requiring enclosures. Units shall conform to OSHA Standard 1926.1101, Appendix F, and shall be designed in accordance with 40 CFR 61, Subpart M, Section 61.153.
    1. Exhaust directly to building exterior. Provide a backup portable air filtration unit at each removal enclosure. Start up ventilation units prior to initiating asbestos removal operations and run until the Owner's consultant has approved their shut-down after cleaning, sampling, visual inspection, and tear-down.
    2. Direct air movement within the enclosure away from the employees' work area and toward the air filtration device.
    3. Provide not less than 4 air changes per hour within the enclosure.
    4. Within the enclosure, through the period of its use, maintain a pressure differential of not less than minus 0.02 water gage with respect to ambient conditions outside the enclosure.
9. Visually inspect the enclosure for breeches and smoke-test for leaks before work begins, and before the start of each work shift. Make all modifications to the enclosure prior to starting removal work.

B. Asbestos Removal Operations: Comply with the following requirements for asbestos removal operations:

1. Immediately preceding asbestos removal, apply a fine mist of amended water (water and wetting agent) to the asbestos materials and the surrounding area. Keep surrounding areas wet by spraying periodically with amended water. Maintain a high humidity environment to assist in fiber settling.
2. Remove asbestos material using two-person teams, on staging platforms, if necessary.
3. Remove the wet asbestos material as intact sections or components. Carefully lower the material to the floor or place directly into container. Never drop or throw asbestos material on the floor.
4. At working heights between 15 and 50 feet above the floor, place removed asbestos materials in containers at the elevated levels and lower to floor, or place onto inclined chutes or scaffolding for subsequent collection and placement into containers. Clean all debris at the completion of each workday.
5. Once the asbestos material is at ground level, pack in labeled 6-mil polyethylene bags, wet and, if appropriate, hold in drums prior to starting the next section.
6. Use 2 sealed and labeled 6-mil thick bags for storage and transportation of asbestos waste. Standing water shall be in each bag
7. Wrap large components removed intact in two layers of 6-mil polyethylene sheeting, label, and secure with tape for transport to the landfill. Comply with all wetting requirements.
8. Treat wires, hangers, steel bands, nails, screws, metal lath, tin sheeting, and similar sharp objects removed with asbestos material as asbestos waste. Place in drums for disposal.
9. Label containerized asbestos waste in accordance with OSHA, EPA, and Department of Transportation regulations, as follows:
    1. Label each container with OSHA label that contains the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG
DISEASE HAZARD

    2. Label each container with Owner's and Asbestos Abatement Firm's names and addresses as required by NESHAP. Owner's address is 301 E. Huron, Ann Arbor, MI 48104.

3. Label each container with Class 9 Label required by DOT and identify waste as "RQ, Asbestos NA 2212."

10. Prepare a complete and accurate NESHAP Waste Shipment Record (special manifest). Assure all information required by the U.S. Department of Transportation regulation is included. Under "special handling instructions" provide the required DOT identification information: RQ Asbestos 9,NA 2212, PG III.
    1. Do not remove waste from site until Owner's Representative has signed and verified the shipment record.
11. Remove containerized asbestos waste daily from site, or store on site in a locked or secured location until ready for final disposal. Obtain approval of Owner's Representative of the location of disposal containers. Outdoor waste containers shall be fully enclosed and locked. Mark vehicles used to transport waste during the loading and unloading of asbestos waste with a visible sign, as required by NESHAP.
12. Each container shall have excess water evident, or the asbestos waste shall be mixed in a slurry.

C. Post-Removal Operation Requirements: After completion of asbestos removal and clean-up operations, comply with the following requirements:

1. The Asbestos Abatement Firm representative, in presence of Owner's consultant, shall inspect the entire work area for asbestos. Include decontamination unit, all plastic sheeting, seals over doorways, windows, and all other openings.
    1. If any suspect asbestos is found, repeat final cleaning operation, until the visual inspection is satisfactory to the Owner's consultant and the asbestos removal firm. Asbestos not scheduled to be removed as part of the project is exempt.
2. Encapsulate all walls, floors, ceilings, other exposed surfaces, and decontamination facilities after completing the work area inspection.
    1. Remove the inner polyethylene barrier that is not integral to maintaining negative pressure in the enclosure at this time, and post-abatement air samples will be collected by Owner's consultant. Immediately clean any asbestos-containing materials observed behind these secondary barriers.
3. When post-abatement fiber levels are greater than either 0.01 fiber/cc or background level, repeat cleanup operation until the area is below either 0.01 fibers/cc or background level.
4. When the post-abatement samples are in compliance, and the Owner's consultant has completed the visual inspection, the enclosure shall be removed.
    1. Turn off HEPA filter exhaust units only after all barriers have been removed.
    2. A final visual inspection will then be conducted by the Owner's consultant before the Contractor is released from the removal site. The final inspection will include tape, polyethylene sheet, debris, and equipment.

3.3 REMOVAL BY NEGATIVE PRESSURE GLOVE BAG SYSTEMS

A. Equipment and Materials: Use the following equipment and materials for each glovebag procedure:

1. Glovebags fabricated of 6-mil thick plastic without seams at the bottom.
2. HEPA vacuum system attached to the glovebag and run continuously during operation.
3. Protective suits and respirators.
4. Plastic sheeting.
5. Wetting agent.
6. Encapsulant.

B. Procedures: Comply with the following glovebag method requirements:

1. Wrap loose and friable material adjacent to the removal area in 2 layers of 6-mil thick plastic, or otherwise render intact.
2. Place plastic sheeting on the floor and equipment beneath each glovebag.
3. Wet-wipe or HEPA vacuum dust and dirt from insulation to be removed.
4. Install glovebags to completely cover the circumference of pipe or other structure where work is to be done.
5. Smoke-test glovebags for leaks. Seal leaks prior to use.
6. Insert and seal equipment that penetrates the bag (spray wands, vacuum nozzles) before insulation is disturbed.
7. Wet the insulation to be removed before, during, and after the removal.
8. Provide only bags capable of withstanding constant wetting and evacuation through a HEPA filtered device.
9. During the performance of glovebag operations removing thermal systems, insulation, or surfacing materials, employ not less than 2 persons, working simultaneously, for each task.
10. Wipe insulation residue from the pipe prior to application of an encapsulant.
11. Spray the pipe and glovebag with an encapsulant before the bag is removed from the pipe.
12. Seal exposed insulation ends with a heavy grade mastic.
13. Follow glovebag manufacturer's instructions.
14. Comply with requirements for asbestos waste disposal indicated in "Removal by Full Enclosure Method" of this Section.

C. Unacceptable Conditions and Procedures and Conditions: In general, do not use the glovebag method in conditions that prevent safe completion of the removal process. The following procedures are not allowed during glovebag removal:

1. Removing severely damaged insulation.
2. Overloading glovebag.
3. Sliding or moving insulation or glovebag along pipe.
4. Squeezing bags to remove air.
5. Placing glovebags on pipes or other surfaces that exceed 150 deg. F.
6. Using a glovebag more than once.

3.4 REMOVAL BY ENTIRE STRUCTURES METHOD

A. The removal of entire structures without disturbing the asbestos is encouraged. An example is removal of asbestos covered pipe fittings by cutting out the entire pipe section scheduled for demolition.

1. Obtain Owner's Representative's approval of removal by entire structures method prior to starting the project.

B. Required Procedures: Comply with the following requirements applicable to removal of entire structures:

1. Properly wet all asbestos materials before starting procedure. Ensure that material stays adequately wet throughout the entire procedure by continuing application of water as needed.
2. Properly and fully wrap and label the structure before it is moved or cut out.
3. Provide the equipment necessary for asbestos debris cleaning on site during the procedure.
4. Comply with requirements for asbestos waste disposal indicated in "Removal by Enclosure Full Method" Article of this Section.

3.5 FIELD QUALITY CONTROL

A. Pre-Notification of Owner's Representative: To permit adequate time to schedule air monitoring, notify the Owner's representative not less than 10 calendar days prior to planned start of all removal operations.

B. Air Monitoring: Except for roofing removal work Owner will retain a professional independent industrial hygiene consultant to collect air samples and oversee the project to insure that compliance with applicable codes, regulations, and ordinances, including 29 CFR 1926.1101, NESHAP, and P.A. 135. The consultant will collect background, contiguous, work area, personal, and post-abatement air samples. Owner will provide one copy of the report to the Contractor if requested.

1. If contiguous sampling indicates airborne fiber concentrations above 0.01 fibers/cc or background level, work will be stopped unless otherwise approved by Owner. Work may resume when the source of contamination has been corrected and the contamination has been cleaned to the satisfaction of the Owner.
2. Glovebag, entire structures, and full enclosure clearance sampling will be by the aggressive PCM method when feasible. Enclosures must be fully dry before sampling.
3. Roofing removal Contractors may provide their own air monitoring in compliance with roofing removal requirements of this Section.

C. Inspection: If during the project, Owner's representative or Owner's consultant determines that work practices either violate applicable rules and regulations or endanger employees, the Contractor's on-site representative shall stop operations immediately and take corrective action. Cooperate fully with Owner's representative and Owner's consultant.

3.6 REMOVAL OF NON-FRIABLE ASBESTOS-CONTAINING MATERIALS

A. Removal of Non-Friable Materials, General: For each type of non-friable asbestos-containing material indicated, comply with the following requirements:

1. Comply with requirements of Article 3.1 of this Section.
2. Conduct non-friable material removal operations to prevent the material from becoming friable during the removal and disposal process. No visible emissions are permitted. If the material does not remain substantially intact, comply with the requirements for friable asbestos removal specified in Articles 3.2 of this Section (except roofing removal).
3. Place impermeable drop cloths on surfaces beneath removal activity.
4. Do not conduct asbestos removal unless the Owner's Consultant is present at the site and Owner has been notified. For roofing removal projects, notify Owner prior to start of work.
5. Labeling Containerized Waste: Comply with the requirements of Article 3.2, paragraphs B.9.a. through c. of this Section.

B. Removal of Resilient Flooring Materials:

1. Prior to removal, critical barriers shall be placed over openings to the regulated area. During removal, air in the regulated area shall be filtered through the use of air filtration device(s).
2. Removal of floor tile with an infrared heat machine eliminates the critical barrier and negative pressure requirements.
3. Prior to removal, clean floors of dirt and debris with vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (brush tools are not permitted). Control odors and fumes with engineering controls.
4. Sanding the floor or related backing is not permitted.
5. Mechanical chipping of vinyl floor tile is prohibited, except when performed in a negative pressure enclosure.

6. Thoroughly wet vinyl floor tile with amended water. Use a slip scraper or equivalent to loosen the floor tile from the floor. Remove the floor tile in an intact state. Keep the floor tile wet throughout the removal and cleanup.
    1. Removal of floor tile using an infrared heat machine eliminates the wetting requirement.
7. Remove vinyl sheet flooring by cutting while wetting the snip-point. Wet sheet flooring during delamination. Rip-up of resilient flooring material is not permitted.
8. Clean resilient flooring of all debris using a HEPA vacuum, wet sweeping, mopping or equivalent and allow time to dry. Dry sweeping is prohibited.
9. Place the resilient flooring material and debris in an asbestos disposal bag. Seal the bag and place it in a properly labeled drum or polyspun bag. Comply with the disposal and labeling requirements of this Section.

C. Asbestos Mastic Removal:

1. Clean the floor of all debris using a HEPA vacuum, wet sweeping, mopping or equivalent.
2. Remove as much mastic as possible using a solvent. Control odors and fumes with engineering controls.
3. Perform scraping of residual adhesive and backing using wet methods.
4. After all debris is removed, thoroughly mop the floor and allow time to dry.
5. If shot blasting is used to remove mastic, comply with requirements for friable asbestos removal specified in Article 3.2 of this Section.
6. Properly dispose of all asbestos and solvent waste according to all applicable regulations, and comply with the disposal and labeling requirements of this Section.

D. Asbestos-Containing Siding, Transite Panels, and Laboratory Counter Tops: Remove non-friable asbestos-containing siding, shingles, transite panels, and laboratory counter tops using the following technique:

1. Cutting, abrading, or breaking material is not permitted.
2. Wet material with amended water prior to removal.
3. Carefully disassemble material such a manner as to prevent breakage.
4. Wrap and seal material in two layers 6-mil thick polyethylene, asbestos disposal bags, or equivalent. Seal bags or packages and properly label them with appropriate asbestos warning signs as indicated in "Removal of Non-Friable Materials, General" Article of this Section.
5. Immediately lower to the ground unwrapped or unbagged materials via covered, dust-tight chute, crane, or hoist; or place in an impervious waste bag or wrap in plastic sheet and lower to the ground no later than the end of the work shift.
6. Clean the floor of all debris using a HEPA vacuum, wet sweeping, mopping or equivalent and allow time to dry.
7. Dispose of asbestos waste in accordance requirements of this Section.

E. Non-Friable Asbestos-Containing Roofing Materials: Non-friable asbestos-containing roofing materials may be removed in a non-friable state. This specification does not apply to removal of intact cements, coatings, or mastics. Remove non-friable asbestos-containing roofing materials in using the following technique:

1. Each employee who is likely to disturb or handle asbestos material shall have completed an 8-hour training class, and the project shall be supervised by a competent person who has completed the appropriate contractor/supervisor course.
2. Isolate roof level heating and ventilation air intake sources within the regulated area and others that will be affected; or arrange for shut-down the affected ventilation system during removal operations. Acceptable isolation techniques include the following:
    1. Use 20-foot or larger buffer zones.
    2. Installation of HEPA filters over the air intakes.

3. Erection of horizontal or vertical extensions that relocate the opening of the intake outside or above the regulated area.
4. Covering the intake with plastic sheeting or other appropriate barrier.

3. Personal protective equipment (PPE), including disposable coveralls and NIOSH approved appropriate high efficiency particulate absolute (HEPA) respirators, shall be worn by personnel if the asbestos containing material is not removed in an intact state.
4. Remove roofing material in an intact state.
5. Use wet methods to remove materials that are not intact, or that are rendered not intact during removal, except where wet methods will create a safety hazard or are otherwise not feasible.
6. Continuously apply a water mist to the blade of power cutting tools, unless a competent person determines that misting will substantially decrease worker safety.
7. When removing roofing felts, collect the dust generated by power roof cutters with a HEPA-filtered dust collector; or immediately vacuum using a HEPA-filtered vacuum along the cut line. For smooth surfaces only, gently sweep wet dust generated from cutting operations, and carefully and completely wipe up the still-wet dust and debris.
8. For removal and repair operations of intact roofing less than 25 sq. ft. in area, the use of wet methods or HEPA vacuuming is not required, provided manual methods do not render the material non-intact and no visible dust is created.
9. Do not drop or throw to the ground asbestos-containing roofing material that has been removed. As soon as practicable, but not later than the end of the work shift, lower debris to ground either by passing or carrying by hand, or by lowering to the ground in a covered, dust-tight chute, crane or hoist.
    1. While on the roof, keep non-intact asbestos-containing materials wet; or seal in impermeable waste bags, or wrap in plastic sheeting.
    2. While on the roof, intact asbestos-containing material is not required to be kept wet, bagged, or wrapped.
10. Upon being lowered to the ground, transfer unwrapped material to a closed receptacle in manner that precludes the dispersion of dust. Dispose of the material in an asbestos-accepting Type II landfill. Notify the landfill that the roofing material contains asbestos and provide waste shipment records to Owner within 35 days.
11. For removal of intact pipeline asphaltic wrap or roof flashings that contain asbestos, engage a competent person to examine the material and determine whether the material is intact and likely to remain intact during removal. Remove the material using manual methods. Sanding, grinding, or other abrading operations are not permitted. Do not throw or drop materials to the ground. Lower the material in a covered, dust-tight chute, crane, or hoist. Remove debris from the roof at the end of the work shift.

F. Non-Friable Asbestos Containing Exterior Sealant, Caulk, Putty and Window Glazing: Remove exterior non-friable asbestos-containing sealants, caulk, putty and window glazing using the following technique:

1. Any existing loose material shall be HEPA vacuumed prior to removal.
2. The material shall be thoroughly wetted prior to and during its removal.
3. The material should be removed as intact as possible. Manual methods such as scraping or raking shall be used, unless power tools are used that are equipped with HEPA ventilation. If power tools are used comply with Article 3.2 (Asbestos Removal by Full Enclosure Method) of this Section.
4. Asbestos containing materials removed, shall be immediately bagged or wrapped and kept wetted until transferred to a closed receptacle.
5. The removal of windows and other whole building components without disturbing the asbestos is encouraged. An example of this would be removing a window with asbestos containing glazing or caulk by cutting out the entire window scheduled for demolition. Comply with Article 3.4 (Removal by Entire Structures Method) of this Section when removing entire building components containing asbestos.

6. If the material becomes friable during the abatement process, comply with the requirements for friable asbestos removal specified in Article 3.2 (Asbestos Removal by Full Enclosure Method) of this Section.
7. Dispose of all asbestos containing materials, including those removed by the entire structures method, per the requirements of this Section.

3.7 SCHEDULE OF ITEMS CONTAINING ASBESTOS

A. Bidding Requirements: Comply with the following requirements related to bidding:

1. Survey quantities provided are approximate. Bidders are required to field investigate as necessary and assume all responsibility to verify the work required and quantities involved for complete asbestos abatement.
2. The building is open for field inspection by all bidders during the bidding period.
3. A "pre-bid orientation meeting" will be conducted to familiarize prospective bidders with site conditions and provide for verification of marked and scheduled quantities, as applicable.
4. The below materials have been survey and determined to contain asbestos

    A. 12”X12” Gray Floor Tile and Mastic (Under Kitchen Cabinets) – 30 s.f.
    B. Sink Undercoating – 1 sink
    C. Transite Panels – 350 s.f.

LIMITED BUILDING MATERIAL SURVEY OF
SUSPECT ASBESTOS CONTAINING MATERIALS

FIRE STATION 4

INSPECTION DATE - 08/02/2024

HA #	ROOM# / LOCATION	FLOOR	DESCRIPTION	POS or NEG	QUANTITY
1	**KITCHEN**	**1**	**12" X 12" GRAY FLOOR TILE (UNDER CABINETS)**	**POSITIVE**	**30 S.F.**
1A	**KITCHEN**	**1**	**MASTIC, 12" X 12" GRAY FLOOR TILE (UNDER CABINETS)**	**POSITIVE**	**30 S.F.**
17	**KITCHEN**	**1**	**SINK UNDERCOATING**	**POSITIVE**	**1**
18	**EXTERIOR**	**1**	**TRANSITE PANELS**	**POSITIVE**	**350 S.F.**
2	LOCKER ROOM	1	2' X 2' BLUE FLOOR TILE	NEGATIVE	-
3	LOCKER ROOM	1	2' X 2' CEILING PANEL - SMALL AND MEDIUM DOTS	NEGATIVE	-
4	KITCHEN	1	2' X 2' FLOOR TILE - BLUE WITH SQUIGGLES	NEGATIVE	-
4	GARAGE	1	2' X 2' FLOOR TILE - BLUE WITH SQUIGGLES	NEGATIVE	-
5	SLEEPING QUARTERS	1	2' X 4' CEILING TILE	NEGATIVE	-
5	CAPTAINS QUARTERS	1	2' X 4' CEILING TILE	NEGATIVE	-
6	KITCHEN	1	4" BLACK COVE BASE	NEGATIVE	-
7	SLEEPING QUARTERS	1	4" YELLOW COVEBASE	NEGATIVE	-
8	EXTERIOR	1	AC UNIT GRAY SEALANT	NEGATIVE	-
9	EXTERIOR	1	BAY DOOR BROWN SEALANT	NEGATIVE	-
10	BOILER ROOM	1	BOILER INSULATION	NEGATIVE	-
11	GARAGE	1	CINDERBLOCK	NEGATIVE	-
12	GARAGE	1	CINDERBLOCK MORTAR	NEGATIVE	-
13	GARAGE	1	CONCRETE	NEGATIVE	-
14	BOILER ROOM	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	LIVING ROOM	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	GARAGE	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	LOCKER ROOM	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	SLEEPING QUARTERS	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	KITCHEN	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	SLEEPING QUARTERS	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	CAPTAINS QUARTERS	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	HALL	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	BATHROOM	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	OFFICE	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
14	EXCERSIZE ROOM	1	DRYWALL, TAPE, AND MUD	NEGATIVE	-
15	BOILER ROOM	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
15	LIVING ROOM	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
15	GARAGE	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
15	LOCKER ROOM	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
15	SLEEPING QUARTERS	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
15	EXCERSIZE ROOM	1	FIBERGLASS PIPE INSULATION	NEGATIVE	-
19	EXTERIOR	1	GRAY DOOR FRAME SEALANT	NEGATIVE	-
20	BOILER ROOM	1	HVAC FABRIC	NEGATIVE	-
6A	KITCHEN	1	MASTIC, 4" BLACK COVE BASE	NEGATIVE	-
7A	CAPTAINS QUARTERS	1	MASTIC, 4" YELLOW COVE BASE	NEGATIVE	-
16	BOILER ROOM	1	MUD FITTINGS	NEGATIVE	-
16	LIVING ROOM	1	MUD FITTINGS	NEGATIVE	-
16	GARAGE	1	MUD FITTINGS	NEGATIVE	-
16	LOCKER ROOM	1	MUD FITTINGS	NEGATIVE	-
16	SLEEPING QUARTERS	1	MUD FITTINGS	NEGATIVE	-
16	EXCERSIZE ROOM	1	MUD FITTINGS	NEGATIVE	-
21	ROOF	1	RUBBER MEMBRANE ROOF	NEGATIVE	

Materials containing >1% asbestos are regulated asbestos containing materials

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

C. Under-lavatory pipe supply covers.

D. Utility room accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 8300 - Mirrors: Other mirrors.

B. Section 09 3000 - Tiling: Ceramic washroom accessories.

C. Section 22 4000 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM C1036 - Standard Specification for Flat Glass; 2021.

C. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

F. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

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

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.02 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.03 COMMERCIAL TOILET ACCESSORIES

A. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
   1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
   2. Size: As indicated on drawings.
   3. Frame: 0.05 inch (1.3 mm)angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
   4. Backing: Full-mirror sized, minimum 0.03 inch (0.8 mm) galvanized steel sheet and nonabsorptive filler material.
   5. Adjustable Tilt Mirrors: Stainless steel piano hinge full width of base and elbow hinges at sides of mirror, for minimum tilt forward from top of 6 inches (150 mm).

6. Shelf: Stainless steel; gauge and finish to match mirror frame, turned down edges, welded to frame; 5 inches (125 mm) deep, full width of mirror.

B. Grab Bars: Stainless steel, textured surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
      b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
      c. Finish: Satin.
      d. Length and Configuration: As indicated on drawings.

C. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Products:
      a. American Specialties, Inc; 0852: www.americanspecialties.com/#sle.
      b. Substitutions: Section 01 6000 - Product Requirements.

2.04 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch (25 mm) outside diameter, 0.04 inch (1.0 mm) wall thickness, satin-finished, with 3 inch (75 mm) outside diameter, minimum 0.04 inch (1.0 mm) thick satin-finished stainless steel flanges, for concealed mounting.

B. Shower Curtain:
   1. Material: Nylon reinforced vinyl, 0.008 inch (0.2 mm) thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
   2. Size:as shown on drawings, hemmed edges.
   3. Grommets: Stainless steel; pierced through top hem on 6 inch (150 mm) centers.
   4. Color: White.
   5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
   1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
   2. Size: ADA Standards compliant.

D. Wall-Mounted Soap Dish: Heavy duty, seamless stainless steel, surface-mounted with drain holes, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate and backplate.

E. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Under-Lavatory Pipe and Supply Covers:
   1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
   2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
   3. Construction: 1/8 inch (3.2 mm) flexible PVC.
      a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
      b. Comply with ICC A117.1.
      c. Microbial and Fungal Resistance: Comply with ASTM G21.
   4. Color: White.

2.06 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch (6 mm) diameter.
   2. Hooks: Two, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
   3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   4. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

D. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
   1. Grab Bars: As indicated on drawings.
   2. Other Accessories: As indicated on drawings.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 12 93 00
SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: the Contractor shall furnish all labor, materials, equipment, transportation, services and necessary appurtenant work required to complete the work shown on the Plans and/or specified herein**.**

B. Extent of work shall include but not be limited to:

1. Bicycle hoops
2. Basketball hoop

1.02 RELATED DOCUMENTS

A. Attention is directed to Bidding and Contracting requirements, drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections, which are hereby made part of this section.

B. Related Sections:

1. Article 10: Construction Specifications (Ann Arbor Public Services Standard Specifications 2024)

1.03 REFERENCE SPECIFICATION

A. Materials and Work covered under this Section shall be in accordance with Ann Arbor Public Services Department 2024 Standard Specifications unless otherwise indicated. All work under this Contract which is not included in the Ann Arbor Public Services Department 2024 Standard Specifications, or which is performed using modifications to those Standard Specifications, shall be performed in accordance with the Detailed Specifications included in these contract documents. If a conflict exists between specifications, the more rigorous shall govern.

1.05 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

PART 2 - PRODUCTS

2.01 BICYCLE HOOPS

A. Manufactured by CycleSafe, Inc.
B. Model: 12700 Surface Mount Classic U Rack
C. Mount: Surface
D. Finish: Black Powder-coated
E. Install per manufacturer’s instructions.

2.02 BASKETBALL HOOPS

A. Manufactured by Bison Inc. (800) 247-7668; bisoninc.com

B. Product Description: 4-1/2" Heavy Duty Steel Rectangle Playground Basketball System with 60” safe-play area. Item number: PR60XL. See attached document for manufacturer instructions.

PART 3 - EXECUTION

3.1 BICYCLE HOOP INSTALLATION

A. Bicycle hoops shall be installed “Surface Mount” as recommended by manufacturer and as indicated in the drawings and specifications.

3.2 BASKETBALL HOOP INSTALLATION

A. Basketball Hoop shall be installed per manufactures standards and specifications and as shown on drawings.
B. Footing depth per drawing detail.

END OF SECTION

(See next page for manufacturer instructions for basketball hoop.)

—— Installation & Safe Use Manual ——

MODELS: PR52, PR52XL, PR55, PR55XL, PR60, PR60XL, PR70, PR70XL, PR70G, AND BA777 OR BA777XL POLES ORDERED SEPARATELY

Heavy Duty Gooseneck Basketball Systems

Customer Service
(800) 247-7668

PARTS LIST

Item	Qty	Description	Item	Qty	Description
A	1	Gooseneck Pole	L	2	7/16” Lock Washer
B	1	Backboard Mounting Bracket	M	2	7/16” Hex Nut
C	3	Band Clamp	N	2	Backboard Brace
D	2	7/16” x 2” Carriage Bolt	O	2	1/2” Set Screw, Square Head
E	2	3/8” x 1” Hex Bolt	P	2	1/2” Jam Nut
F	2	3/8” Flat Washer	Q	1	Backboard (packaged separately)
G	2	3/8” Lock Washer	R	1	Rim, Mounting Hardware, & Net (packaged separately)
H	3	5/16” x 2” Carriage Bolt	S	1	1/4” x 1” Roll Pin
I	2	5/16” x 1” Carriage Bolt	T	TBD	Quick Dry Concrete (supplied by customer)
J	5	5/16” Flange Nut	U	1	Pole Pad (optional)
K	2	7/16” Flat Washer			

- **Inspect all contents prior to installation. Report any missing parts to dealer immediately.**
- **Read all instructions before proceeding.**
- **Save this instruction in the event that the manufacturer must be contacted in the future**

1. Call your local utility locating service, usually by dialing 811, before digging to avoid serious injury or service interruption.

2. Select the location for the concrete base footing. Note that the face of the *Backboard* (Q) will be approximately 48” from the center of the footing for a BA777 Pole and 60” for a BA777XL Pole. Dig a 12” diameter hole that is 48” deep. Remove additional soil from the bottom 1/3-1/2 of the hole in a bell shape to add pole stability. In areas where the normal frost line is below 48” it is advisable to dig to the normal frost line. See Figure 1.

3. Make sure that you have a level and a broomstick or similar pole to vibrate air pockets out of concrete. A 12” diameter by 36” deep hole with a bell bottom will require approximately 4 cubic ft. or 3000 PSI *Quick Dry Concrete* (T). You will need to adjust the amount depending on the size of hole you prepared. Having too much is better than having too little.

4. Mix concrete according to the directions on the bag. It is advantageous to have the mixture “wet”. This will increase your working time and allow batches to mix in the hole. Pour the hole full to ground level.

5. Attach one *Band Clamp* (C) with *5/16" x 2" Carriage Bolt* (H), and *5/16" Flange Nut* (I) approximately 12" from the bottom end of pole and insert pole into concrete while vibrating concrete to allow it to surround the pole completely. The horizontal extension section of the pole should be parallel to the playing surface, perpendicular to the intended court end line and the lower surface of the horizontal portion of the tube should be 9' 6 1/2" above the playing surface. You will need to brace the pole to maintain this dimension to insure the rim height will be at official 10'.
See Figure 1 & 2

6. Trowel the top of the concrete smooth and clean any excess off the *Gooseneck Pole* (A). **Allow the footing to cure for at least 48 hours.** Do not proceed any further until concrete is completely cured.

7. Attach the *Rim* (R) and *Backboard* (Q) to the *Backboard Mounting Bracket* (B) using the hardware provided with the *Rim* (R). See Figure 3.

8. Slide two *Band Clamps* (C) onto the horizontal portion of the *Gooseneck Pole* (A). See Figure 4.

9. Install the *Backboard Mounting Bracket* (B), *Backboard* (Q), and *Rim* (R) assembly onto the end of the *Gooseneck Pole* (A). It is easiest to install the assembly upside down and then rotate 180° before installing and tensioning the *1/2" Square Head Set Screws* (O). Confirm that the *Rim* (R) and *Backboard* (Q) are level before tightening the *1/2" Square Head Set Screws* (O) against the *Gooseneck Pole* (A). Install and tighten the *1/2" Jam Nuts* (P) to lock the *1/2" Square Head Set Screws* (O) in place. See Figure 4

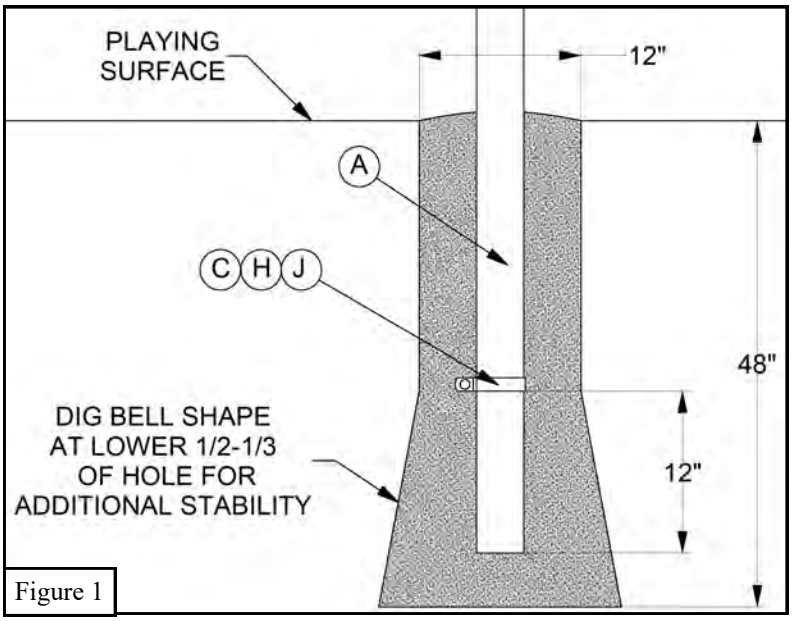


Figure 1

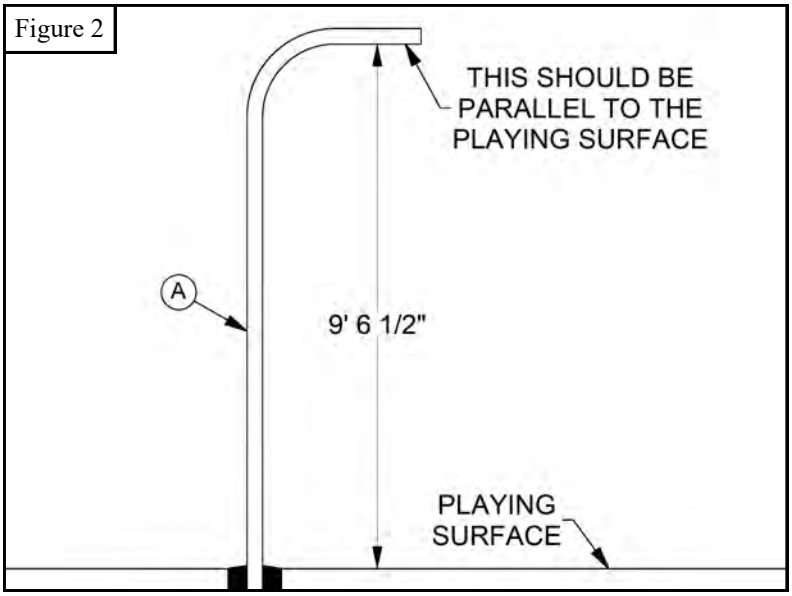


Figure 2

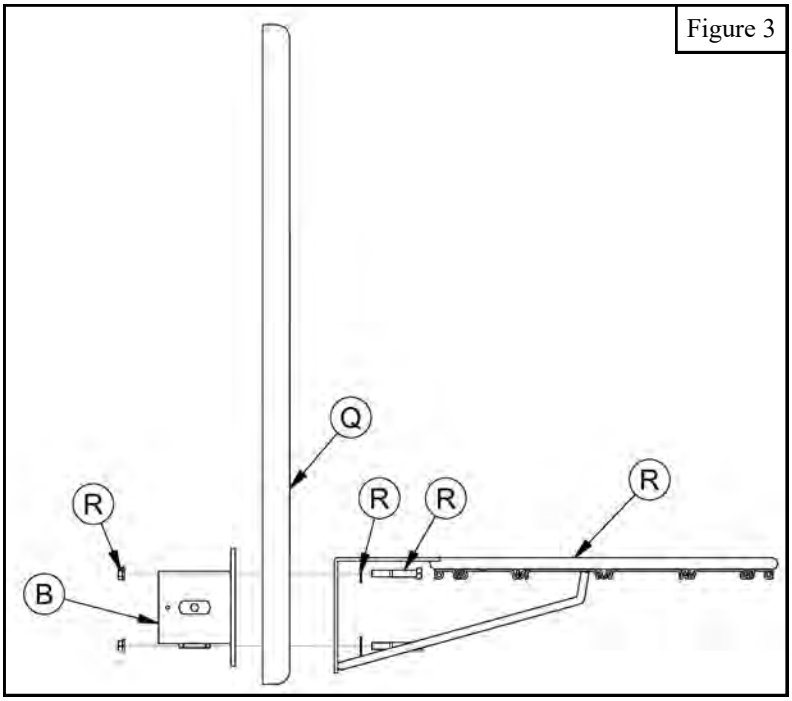


Figure 3

Figure 4

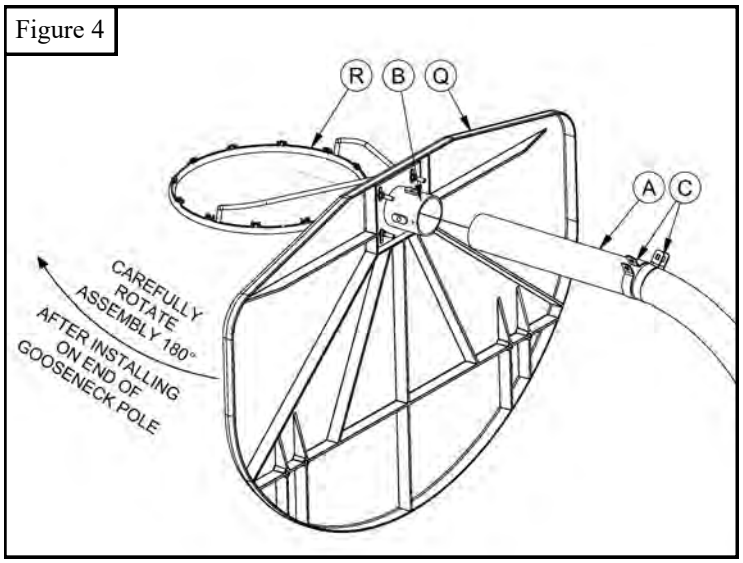
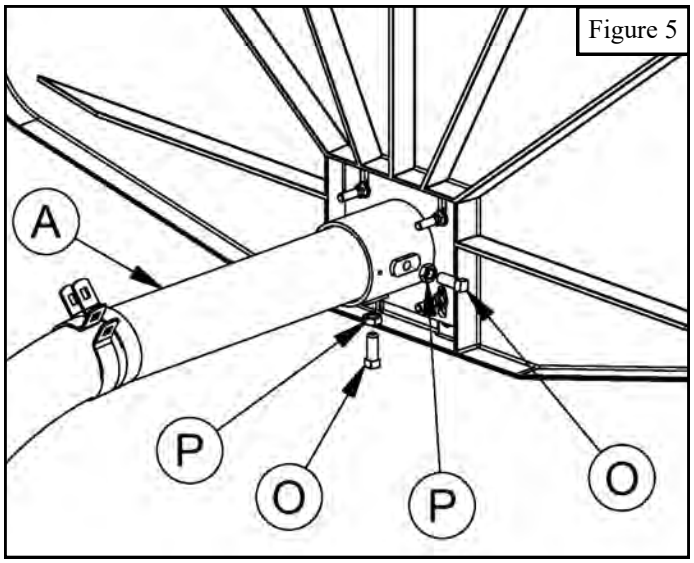
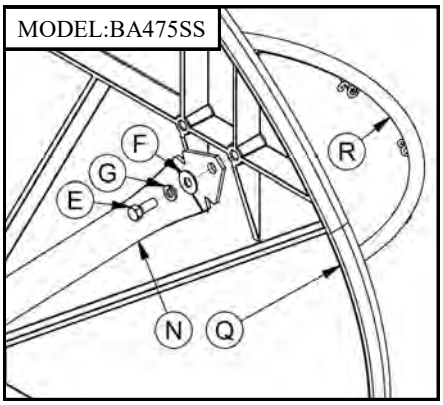


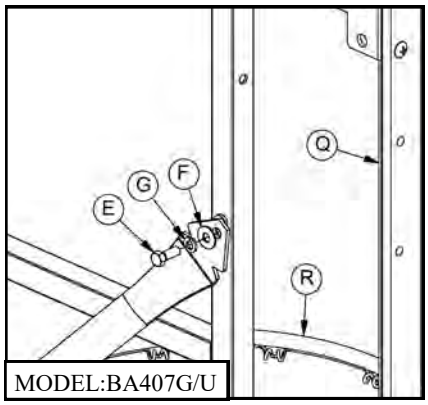
Figure 5



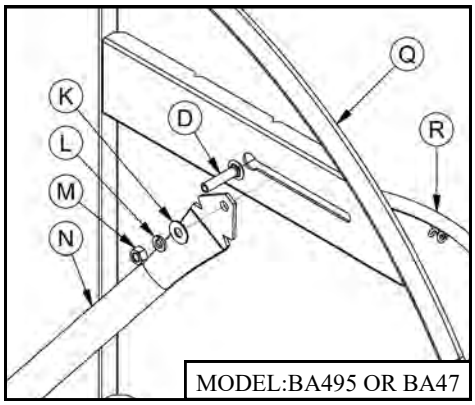
10. Referencing the illustrations below fasten *Backboard Braces* (N) to the *Backboard* (Q). Each model will require different hardware to attach the Backboard Braces (N) to the Backboard (Q). **BA475SS & BA407G/U** require *3/8" x 1" Hex Bolts* (E), *3/8" Flat Washers* (F), and *3/8" Lock Washers* (G). **BA495 & BA47** require *7/16" x 2" Carriage Bolts* (D), *7/16" Flat Washers* (K), *7/16" Lock Washers* (L), and *7/16" Hex Nuts* (M). *Backboard Braces* (N) will need to be bent on the ends to match the angles of the *Backboard* (Q) and *Band Clamps* (C). Exact angle will depend on the *Backboard* (Q) model selected. This can easily be accomplished in a number of ways, including contacting the end of the *Backboard Brace* (N) on a concrete surface. See illustrations below.

MODEL:BA475SS





MODEL:BA407G/U



MODEL:BA495 OR BA47

11. Attach the other ends of the *Backboard Braces* (N) to the *Band Clamps* (C) using the *5/16" x 2" Carriage Bolts* (H) and *5/16" Flange Nuts* (J). See Figure 6.

12. Confirm *Backboard* (Q) and *Rim* (R) are still level before drilling a 1/4" diameter hole into the *Gooseneck Pole* (A) using the pilot hole in the *Backboard Mounting Bracket* (B) as a guide. Install the *1/4" X 1" Roll Pin* (S) into the hole you just drilled with a hammer to further reduce the risk of rotation or movement. See Figure 7

13. Attach *Net* (R) and optional *Pole Pad* (U) if applicable. The system is now ready for play.

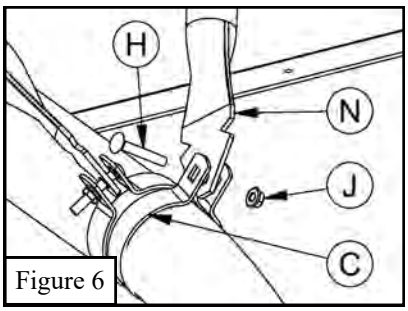
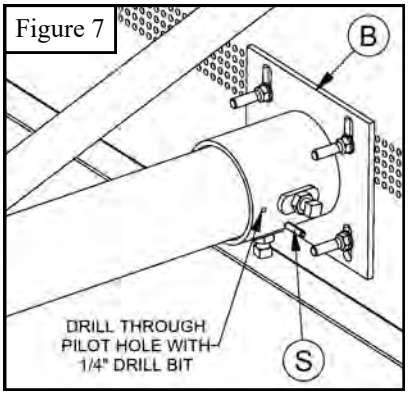


Figure 6

Figure 7



SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Related Sections include the following:

1. Division 20 Section “Mechanical General Requirements.”
2. Division 20 Section “Basic Mechanical Materials and Methods.”
3. Division 20 Section "Meters and Gages" for thermometers, pressure gages, and flow meters in domestic water piping.
4. Division 22 Section "Domestic Water Piping " for water meters.
5. Division 22 Section "Healthcare Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
6. Division 22 Section "Emergency Plumbing Fixtures" for water tempering equipment.
7. Division 22 Section "Drinking Fountains, Water Coolers and Cuspidors" for water filters for water coolers.

1.02 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.04 INFORMATIONAL SUBMITTALS

A. Shop Drawings: Diagram power, signal, and control wiring.

1.05 CLOSEOUT SUBMITTALS

A. Field quality-control test reports.
B. Flow Reports and Settings: For calibrated balancing valves.
C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.06 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
B. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
C. NSF Compliance:
    1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
    2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
    3. Comply with NSF 372, “Drinking Water System Components – Lead Content” for components with wetted surfaces in contact with potable water.

PART 2 PRODUCTS

2.01 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        a. Apollo Valves; Conbraco Industries, Inc.
        b. FEBCO; a Division of Watts Water Technologies, Inc.
        c. Watts Water Technologies, Inc.; Watts Regulator Co.
        d. Zurn Plumbing Products Group; Wilkins Div.
    2. Standard: ASSE 1001.
    3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
    4. Body: Bronze.
    5. Inlet and Outlet Connections: Threaded.
    6. Finish: Chrome plated.
B. Pressure Vacuum Breakers:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        a. Apollo Valves; Conbraco Industries, Inc.
        b. FEBCO; a Division of Watts Water Technologies, Inc.
        c. Watts Water Technologies, Inc.; Ames Fire & Waterworks.
        d. Watts Water Technologies, Inc.; Watts Regulator Co.
        e. Zurn Plumbing Products Group; Wilkins Div.
    2. Standard: ASSE 1020.
    3. Operation: Continuous-pressure applications.
    4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
    5. Size and Capacity: As indicated on the drawings.
    6. Accessories:
        a. Valves: Ball type, on inlet and outlet.

2.02 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        a. Apollo Valves; Conbraco Industries, Inc.
        b. FEBCO; a Division of Watts Water Technologies, Inc.
        c. Watts Water Technologies, Inc.; Ames Fire & Waterworks.

d. Watts Water Technologies, Inc.; Watts Regulator Co; Model LF009 (main 3" RPZ).
e. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Size and Capacities: As scheduled on the drawings.
6. Body: Bronze for NPS 2 and smaller; cast-iron or ductile-iron, with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories:
   a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
   b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
   c. Y-Pattern strainer and soft-seated check valve.

B. Double-Check Backflow-Prevention Assemblies:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Apollo Valves; Conbraco Industries, Inc.
   b. FEBCO; a Division of Watts Water Technologies, Inc.
   c. Watts Water Technologies, Inc.; Ames Fire & Waterworks.
   d. Watts Water Technologies, Inc.; Watts Regulator Co.
   e. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications, unless otherwise indicated.
4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
5. Size and Capacities: As scheduled on the drawings.
6. Body: Bronze for NPS 2 and smaller; cast-iron or ductile-iron, with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories:
   a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

C. Dual-Check-Valve Backflow Preventers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Apollo Valves; Conbraco Industries, Inc.
   b. FEBCO; a Division of Watts Water Technologies, Inc.
   c. Watts Water Technologies, Inc.; Watts Regulator Co.
   d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1024.
3. Operation: Continuous-pressure applications.
4. Size: As indicated on the drawings.
5. Body: Bronze with union inlet.

2.03 BALANCING VALVES

A. Calibrated Balancing Valves NPS 1/2:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armstrong International, Inc.
   b. Armstrong Pumps, Inc.
   c. Apollo Valves; by Conbraco Industries, Inc.
   d. Bell & Gossett; Xylem Inc.

e. Flo Fab Inc.
f. Flow Design Inc.
g. Griswold Controls.
h. NIBCO INC.
i. IMI Indoor Climate; Tour & Andersson.
j. Taco, Inc.
k. Watts Water Technologies, Inc.; Watts Regulator Co.

2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Dezincification resistant brass, or bronze.
4. Minimum Flow Rate: 0.3 gpm.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

B. Calibrated Balancing Valves NPS 3/4 to NPS 2:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Armstrong International, Inc.
b. Armstrong Pumps, Inc.
c. Apollo Valves; by Conbraco Industries, Inc.
d. Bell & Gossett; Xylem Inc.
e. Flo Fab Inc.
f. Flow Design Inc.
g. Griswold Controls.
h. NIBCO INC.
i. IMI Indoor Climate; Tour & Andersson.
j. Taco, Inc.
k. Watts Water Technologies, Inc.; Watts Regulator Co.

2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Dezincification resistant brass, or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.04 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Acorn Controls; Morris Group International.
b. Apollo Valves; Conbraco Industries, Inc.
c. Bradley Corporation.
d. Lawler Manufacturing Company, Inc.
e. Leonard Valve Company.
f. Watts Water Technologies, Inc.; Powers Division; Hydroguard Series LFe480, LFG480, and LFLM495.
g. Watts Water Technologies, Inc.; Watts Regulator Co.
h. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1070.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: 1/2-inch union or 3/8-inch compression; with integral check valves.
7. Accessories: Adjustable temperature-control knob.
8. Outlet Temperature Range: Adjustable from 85 deg F to 120 deg F. Set at 105 deg F.
9. Minimum Flow Rate: 0.5 gpm.
10. Valve Finish: Rough bronze.

2.05 PREPIPED TEMPERED WATER MIXING SYSTEM

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Acorn Controls; Morris Group International.
    b. Armstrong International, Inc. (RADA).
    c. Bradley Corporation.
    d. Lawler Manufacturing Company, Inc.; Prepiped 802 Hi-Low Tempered water Mixing System.
    e. Leonard Valve Company.
    f. Symmons Industries, Inc.
    g. Watts Water Technologies, Inc.; Powers Division.
    h. Watts Water Technologies, Inc.; Watts Regulator Co.
2. Description: Completely assembled and tested prepiped manifold system including mixing valve(s), recirculation pump, circuit setting balancing valve, aquastat, circulator switch box, thermometers, isolation valves, mounting strut, and test connection.
3. Standard: ASSE 1017.
4. Mixing Valve: Exposed-mounting, thermostatically controlled water mixing valve.
    a. Material: Bronze body with corrosion-resistant interior components.
    b. Connections: Threaded union inlets and outlet.
    c. Accessories: Manual temperature control, check stops and strainers on hot- and cold-water supplies, and adjustable, temperature-control handle.
    d. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.
    e. Size, Settings, and Capacities: As scheduled on the drawings.
    f. Valve Finish: Rough bronze.
5. Pump: Meeting requirements in Division 22 Section “Domestic Water Circulation Pumps.”
6. Mounting Strut: Meeting requirements in Division 20 Section “Hangers and Supports.”

2.06 OUTLET BOXES

A. Clothes Washer Outlet Boxes:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        a. Sioux Chief Manufacturing Company, Inc.; Ox Box.
        b. Oatey SCS.
        c. Guy Gray Manufacturing Co., Inc.
    2. Mounting: Recessed.
    3. Material and Finish: Enameled- or epoxy-painted-steel or Stainless-steel box and faceplate.
    4. Faucet: Combination, valved fitting or separate hot- and cold-water, valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
    5. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
    6. Drain: NPS 2 standpipe and P-trap for direct waste connection to drainage piping.
    7. Inlet Hoses: Two 60-inch- long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
    8. Drain Hose: One 48-inch- long, rubber household clothes washer drain hose with hooked end.
B. Icemaker Outlet Boxes:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        a. Sioux Chief Manufacturing Company, Inc.; Ox Box.
        b. Oatey SCS.
        c. LSP Products Group, Inc.
        d. Acorn Engineering Company.
    2. Mounting: Recessed.
    3. Material and Finish: Enameled- or epoxy-painted-steel or Stainless-steel box and faceplate.
    4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
    5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.07 HOSE STATIONS (HS-1)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ARCHON Industries, Inc.
   2. Armstrong International, Inc.
   3. Cooney Brothers, Inc.
   4. DynaFluid Ltd.
   5. Leonard Valve Company; SW-75-EVBD W/10 HDH Hose and N2 Nozzle.
   6. Strahman Valves, Inc.
   7. T & S Brass and Bronze Works, Inc.

B. Hot- and Cold-Water Hose Stations:
   1. Standard: ASME A112.18.1.
   2. Type Faucet: Thermostatic mixing valve.
   3. Cabinet: Stainless-steel enclosure with exposed valve handles, hose connection, and hose rack. Include thermometer in front.
   4. Hose-Rack Material: Stainless steel.
   5. Body Material: Bronze with stainless-steel wetted parts.
   6. Body Finish: Rough bronze or chrome plate.
   7. Mounting: Wall, with reinforcement.
   8. Supply Fittings: Two NPS 3/4 gate, globe, or ball valves and check valves and NPS 3/4 copper, water tubing. Omit check valves if check stops are included with fitting.
   9. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; 10 feet long.
   10. Nozzle: With hand squeeze on-off control.
   11. Vacuum Breaker: Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.

2.08 HOSE BIBBS

A. Hose Bibbs HB-1:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. MIFAB, Inc.
      c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc; Model 5670.
      d. Tyler Pipe; Wade Div.
      e. Watts Water Technologies, Inc.; Watts Regulator co.
      f. Woodford Manufacturing Company.
      g. Zurn Plumbing Products Group; Specification Drainage Operation.
   2. Standard: ASME A112.18.1 for sediment faucets.
   3. Body Material: Bronze.
   4. Seat: Bronze, replaceable.
   5. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
   6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
   7. Pressure Rating: 125 psig.
   8. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
   9. Finish for Equipment Rooms: Chrome or nickel plated.
   10. Finish for Service Areas: Chrome or nickel plated.
   11. Finish for Finished Rooms: Chrome or nickel plated.
   12. Operation for Equipment Rooms: Wheel handle or operating key.
   13. Operation for Service Areas: Operating key.
   14. Operation for Finished Rooms: Operating key.
   15. Include operating key with each operating-key hose bibb.
   16. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.09 WALL HYDRANTS

A. Nonfreeze Wall Hydrants WH-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc; Model 5515.
   d. Tyler Pipe; Wade Div.
   e. Watts Water Technologies, Inc.; Watts Regulator co.
   f. Woodford Manufacturing Company.
   g. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.21.3M for self-draining wall hydrants.
3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4 or NPS 1.
7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounting with cover.
9. Box and Cover Finish: Polished nickel bronze or chrome plated.
10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
11. Nozzle and Wall-Plate Finish: Polished nickel bronze.
12. Operating Keys(s): One with each wall hydrant.

2.10 ROOF HYDRANTS

A. Nonfreeze, Draining-Type Roof Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. MIFAB, Inc.
   b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.; Fig. No. 5907.
   c. Tyler Pipe; Wade Div.
   d. Woodford Manufacturing Company.
   e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Type: Nonfreeze, exposed-outlet roof hydrant.
3. Operating Rod: Brass.
4. Casing: Galvanized steel with flange, and under deck clamp.
5. Inlet: NPS 3/4.
6. Outlet: Garden-hose thread complying with ASME B1.20.7.
7. Valve Body: Designed with NPS 1/8 drain hole.

2.11 WATER HAMMER ARRESTERS

A. Water Hammer Arresters (Copper Tube Type):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. MIFAB, Inc.
   b. PPP Inc.
   c. Sioux Chief Manufacturing Company, Inc.
   d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   e. Tyler Pipe; Wade Div.
   f. Watts Drainage Products Inc.
   g. Watts Water Technologies, Inc.; Watts Regulator Co.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

B. Water Hammer Arresters (Metal Bellows Type):
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AMTROL, Inc.
      b. Josam Company.
      c. MIFAB, Inc.
      d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      e. Tyler Pipe; Wade Div.
      f. Watts Drainage Products Inc.
      g. Zurn Plumbing Products Group; Specification Drainage Operation.
   2. Standard: ASSE 1010 or PDI-WH 201.
   3. Type: Precharged stainless steel bellows.
   4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
C. Water Hammer Arresters (Custom Type):
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AMTROL, Inc.
      b. Josam Company.
      c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      d. Zurn Plumbing Products Group; Specification Drainage Operation.
   2. Type: Factory precharged stainless steel pressure chamber with stainless steel bellows and non-toxic hydraulic fluid having pressure gage and air valve with cap.
   3. Size: Custom sized for application by manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
   1. Locate backflow preventers in same room as connected equipment or system.
   2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
   3. Do not install bypass piping around backflow preventers.
   4. Install strainer and soft-seated check valve upstream of backflow preventer. Exception: Fire protection backflow preventers.
C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.
D. Install balancing valves in locations where they can easily be adjusted.
E. Install temperature-actuated water mixing valves with strainers, and check stops or shutoff valves on inlets and with shutoff valve on outlet.
   1. Install thermometers and water regulators if specified.
   2. Install cabinet-type units recessed in or surface mounted on wall as specified.
F. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve, solenoid valve,] and pump.
G. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."
H. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.
   1. Install shutoff valve on outlet if specified.

I. Install roof hydrants in accordance with manufacturer's instructions. Pipe drain hole to acceptable discharge point.

J. Install water hammer arresters in water piping according to PDI-WH 201.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping and specialties.

B. Ground equipment according to Division 26 Section "Grounding and Bonding."

C. Connect wiring according to Division 26 Section "Conductors and Cables."

3.03 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Intermediate atmospheric-vent backflow preventers.
3. Reduced-pressure-principle backflow preventers.
4. Double-check backflow-prevention assemblies.
5. Dual-check-valve backflow preventers.
6. Calibrated balancing valves.
7. Outlet boxes.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 20 Section "Mechanical Identification."

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each backflow prevention device according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.05 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves as follows:

1. Set calibrated balancing valves at calculated presettings.
2. Measure flow each station and adjust where necessary.
3. Record settings and mark balancing devices.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 1119

SECTION 23 0933 - TEMPERATURE CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

B. Related Sections include the following:
   1. Division 20 Section “Mechanical General Requirements.”
   2. Division 20 Section “Basic Mechanical Materials and Methods.”
   3. Division 23 Section “Testing, Adjusting, and Balancing.”

1.02 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

1.03 DEFINITIONS

A. BACnet: Communications open protocol for building automation system networks and control (developed by ASHRAE and documented per ANSI/ASHRAE Standard 135-2012.
B. BAS: Building Automation System
C. CAD: Computer Aided Design.
D. DDC: Direct-digital controls.
E. LonWorks (aka LonTalk): Communications open protocol as developed by Echelon Corporation that is utilized with building automation system networks and control.
F. TC: Temperature Control.

1.04 SYSTEM DESCRIPTION

A. Temperature control building automation system consisting of direct digital control system controllers, sensors, transducers, relays, switches, data communication network, etc. and all associated control wiring and raceway systems.
B. BAS/DDC system programming, database generation. Graphic display generation accessible through Building Network Supervisory Controller or at the remote operator workstation (when applicable for project).
C. Electric thermostats, control valves, dampers, operators, control wiring, etc.
D. Gauges, indicating devices, electric and electronic control accessories, and other control system devices.

1.05 SEQUENCE OF OPERATION

A. Control sequences for HVAC systems, subsystems, and equipment are indicated on project drawings.

1.06 SUBMITTALS

A. Submit under Division 20 and 23 provisions of respective project and as supplemented in this section.
B. All control submittal requirements shall be submitted at one time with exception to control valves, automated dampers, and initial phases of work associated with fast-track projects (when required). Early submittals of control valves and automated dampers shall be incorporated with the complete temperature controls submittal.
C. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
   1. Each control device labeled with setting or adjustable range of control
D. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
E. Shop Drawings:
   1. Shop drawings shall be done on CAD. Minimum size 11” x 17”.
   2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
   3. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
   4. Details of control enclosure including panel faces and interior, including controls, instruments, terminations blocks and component labeling.
   5. Written sequence of operation for each controlled system.
   6. Schedule of dampers including size, leakage, and flow characteristics (Refer to Design Data).
   7. Schedule of valves including leakage and flow characteristics (Refer to Design Data).
   8. Complete bill of materials to identify and quantify all control components.
   9. Overall system schematic showing communication trunk cabling from Building Network Supervisory Controller(s) to BAS field level controllers including component locations and wire termination details.

10. DDC controller layouts showing connected data points and LAN connections. DDC controller terminations including power supply and remote control component termination details shall be provided.
11. Point list for each DDC controller including point descriptions and addresses. This information may be incorporated with DDC controller layouts.
12. List of system graphics to be provided with proposed tree diagram of graphics organization. Items to include: Each system, floor plan.

F. Graphic Displays: One month after TC Shop Drawing submittal, TC Contractor shall submit graphical display backgrounds for preliminary Engineer review. Concept for each floor plan, each system, each terminal unit template. Engineer understands that final representation of graphics may not be available until BAS database is established during course of construction. Thorough graphics review will be conducted by Engineer as part of the TC/BAS acceptance procedure.

G. Design Data: Provide indicated component selection and sizing criteria for the following component categories:
1. Control valves:
    a. Component tag.
    b. Equipment served/function.
    c. Media type.
    d. Design flow rate (GPM or lbs/hr).
    e. Design pressure drop (ft. head) or (psi), where applicable.
    f. Calculated valve Cv, where applicable.
    g. Selected valve Cv, where applicable.
    h. Resultant pressure drop (ft. head) or (psi) with selected valve.
    i. Valve size.
    j. Line size to valve connection (excluding reducers).
    k. Type (ball, butterfly, globe, etc.).
    l. Configuration (2-way, 3-way mixing, 3-way diverting).
    m. Normal position (normally open, normally closed, floating).
    n. Actuator spring range (where applicable).
    o. Actuator power requirement.
    p. Valve shut-off rating (ft. head) of (psi)
    q. Valve body pressure/temperature rating.
    r. Valve manufacturer/model number.
    s. Actuator manufacturer/model number.
2. Dampers:
    a. Component tag.
    b. Equipment served/function.
    c. Overall damper size (inch width x inch height).
    d. Quantity of damper sections with respective size(s):
    e. Material and gauge of thickness.
    f. Mounting orientation (horizontal or vertical).
    g. Blade configuration (parallel or opposed)
    h. Pressure drop (in. WG).
    i. Shut-off rating/differential pressure rating (in. wg).
    j. Leakage rating (CFM/sq.ft. at 4 in. wg).
    k. Normal position (normally open, normally closed, floating).
    l. Actuator spring range (where applicable).
    m. Actuator power requirement.
    n. Actuator torque requirement.
    o. Actuator quantity.
    p. Damper manufacturer/model number.
    q. Actuator manufacturer/model number.
3. Flow measuring probes - Air:

a. Component tag.
b. Equipment served/function.
c. Duct dimension (inch width x inch height) if applicable.
d. Fan inlet diameter (inch) if applicable)
e. Probe quantity.
f. Probe length (inch).
g. Flow rate (CFM).
h. Flow velocity (FPM).
i. Probe manufacturer/model number.
j. Transmitter manufacturer/model number.

4. Flow measuring probes - Water:
   a. Component tag.
   b. Equipment served/function.
   c. Pipe size/inside diameter (inch)
   d. Probe length.
   e. Flow rate (GPM).
   f. Flow velocity (FPS).
   g. Probe manufacturer/model number.
   h. Transmitter manufacturer/model number.
5. Flow measuring stations - Air:
   a. Component tag.
   b. Equipment served/function.
   c. Duct dimension (inch width x inch height).
   d. Station dimension (inch width x inch height).
   e. Flow rate (CFM).
   f. Flow velocity (FPM).
   g. Pressure drop (in. wg).
   h. Station manufacturer/model number.
   i. Transmitter manufacturer/model number.
6. Gauges:
   a. Component tag.
   b. Equipment served/function.
   c. Units/range of scale

H. Wall mounted temperature sensor, thermostat and/or other temperature control device cover color shall be coordinated to match color of wall mounted electrical device components and cover plates – coordinate with electrical contractor. Provide samples of available temperature control device cover colors to Architect upon request or if available temperature control device colors do not match electrical device colors so a desired color selection may be determined. Provide sample of temperature sensor / thermostat guard upon request of Architect, Engineer or Owner.

I. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

J. Submit field reports indicating operating conditions after detailed check out of systems at Date of Substantial Completion.

K. Project Record Documents: Include the following:
   1. Revise Shop Drawings to reflect actual installation and operating sequences.
   2. Record actual locations of control components, including control units, thermostats, and sensors.
   3. Submit the electronic files for all as-built shop drawings in pdf format on USB Flash Drives (3 Total).

L. Software and Firmware Operational Documentation: Include the following:
   1. DDC controller keypad operating instructions and DDC controller override features, where applicable.
   2. Device address list.
   3. Program Software Backup: On a magnetic media or compact disc, complete with data files.
   4. Software license required by and installed for DDC workstations and control systems.

5. DDC workstation software operating instructions for scheduling equipment, trending data, displaying graphics, commanding points, adding/deleting/modifying points, changing setpoints, and setting up alarms.
6. Advanced DDC workstation operating instructions for graphics generation, control sequence programming and program modification.
7. Printout of software applications and graphic screens.

M. Maintenance Manuals: Include the following:
1. Product data with installation details, maintenance instructions and lists of spare parts for each type of control device.
2. Keypad illustrations and step-by-step procedures indexed for each operator function, where applicable.
3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
4. Calibration records and list of set points.

1.07 REFERENCES

A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
B. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure fittings.
C. ANSI/ASTM B32 - Solder Metal.
D. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
E. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
F. ASTM B75 - Seamless Copper Tube for General Engineering Purposes.
G. ASTM D1693 - Environmental Stress - Cracking of Ethylene Plastics.
H. ASTM E1 - Specification for ASTM Thermometers.
I. MMC – Michigan Mechanical Code, version applicable for project.
J. NEMA DC 3 - Low-Voltage Room Thermostats.
K. UL 1820 - Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics Only.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is a certified installer and an approved installer of the automatic control system manufacturer for both installation and maintenance of units required for this Project.
B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
D. Comply with all applicable code requirements for project.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated or optional to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.10 COORDINATION

A. Coordinate work under Division 20 and 23 provisions and as supplemented in this section.
B. Coordinate location of space temperature sensors, space humidity sensor, thermostats, humidistats, and other exposed control sensors with plans and room details before installation.
C. Coordinate installation of system components with installation of mechanical systems and equipment to achieve compatibility.
D. Ensure installation of components is complementary to installation of similar components in other systems.
E. Coordinate control wiring requirements, including actual terminal block numbers, with mechanical equipment manufacturers or suppliers.
F. Coordinate equipment with Division 26 Section "Lighting Controls" to achieve compatibility with equipment that interfaces with that system.
G. Coordinate equipment with Division 28 Section "Fire Alarm" to achieve compatibility with equipment that interfaces with that system.

H. Ensure control system installation is complete, checked, tested and functioning properly prior to system balancing and Owner/Engineer system checkout.

I. Cooperate fully with the Test and Balance Contractor and provide labor to operate the temperature control system as required to meet the scope of work defined in Division 23 Section "Testing, Adjusting and Balancing."

1.11 WARRANTY

A. Provide warranty per Division 20 Section "Mechanical General Requirements" and as supplemented in this section.

B. Provide 24 hour per day emergency service during warranty period, with maximum response period of four (4) hours. Provide phone number(s) for quick assistance by a Service Engineer regarding hardware or software problems.

C. Provide scheduled maintenance service during warranty period to inspect, calibrate, and adjust controls. Make a minimum of one eight hour service call every three months**.** Notify Owner prior to each scheduled inspection trip. Submit written reports upon completion of service.

D. Provide any software or firmware revisions which are released by the DDC system manufacturer during the warranty period, at no additional cost to the Owner.

1.12 POSTED OPERATING INSTRUCTIONS

A. Provide DDC controller related as-built documents in protective binder or clear plastic display envelope for each control enclosure panel. These instructions shall include such items as as-built control diagrams and sequence of operation, simplified narrative instructions and materials necessary to aid in the operation of the equipment at the local control panels.

1.13 SPECIAL TOOLS

A. Deliver two sets of any special tools required for operation, adjustment, resetting or maintenance, excluding PC laptop.

1.14 PROTECTION OF PROPRIETARY INFORMATION

A. Non-disclosure agreement(s) that may be subject to proprietary manuals and software shall be submitted by the proprietary equipment manufacturer to the Owner for approval and signature during the warranty period.

PART 2 PRODUCTS

2.01 DESCRIPTION OF THE BUILDING AUTOMATION SYSTEM (BAS)

A. The building automation system (BAS) shall be fully integrated, distributed data processing system incorporating direct digital control (DDC) for the control and monitoring of heating, ventilating and air conditioning (HVAC) equipment and other related systems. Microprocessor based BAS field level DDC controllers shall be directly connected to HVAC equipment sensors and actuators. A data communication network shall allow data exchange between the BAS field level DDC controllers and the Building Network Supervisory Controller. The Building Network Supervisory Controller shall be the primary operator BAS interface point for the building either through web-browser direct or through server application software (when applicable) or through local or remote Operator Workstation (when applicable to project).

B. Approved Manufacturer – System / Approved Installer (Locations) as listed:

1. Automated Logic Controls / by:

a. Automated Logic Contracting Services, Inc. (Southfield, MI).

b. Metro Controls, Inc. (Clinton Twp, MI).

2.02 BAS BUILDING NETWORK SUPERVISORY CONTROLLER (Proprietary platforms)

A. The Building Network Supervisory Controller shall provide the interface between the Owner's Ethernet and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC.

B. The network supervisory controller shall be sized appropriately per building to handle the required quantity of connected controllers and devices.

C. Manufacturers: As listed for Building Automation System.

2.03 DIRECT DIGITAL CONTROL (DDC) FIELD LEVEL CONTROLLERS

A. Modular in design and consisting of stand-alone microprocessor board with ROM and fully custom programmable RAM, EPROM, and/or EEPROM memory, integral interface equipment and power surge

protection. DDC controllers shall be connected directly to sensors, controlled devices and the communication network.

B. Powerfail Restart and Battery Backup: Minimum of 72 battery backup hours for complete system RAM memory and clock, with automatic battery charger or 48 hour low voltage alarm warning. Upon full system power recovery, all clocks shall be automatically synchronized, and all controlled equipment shall be automatically re-started based on correct clock time and sequence of operation.

C. Provide fully functional communication interface ports for communication between processor, other processors, portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.

D. Panel enclosure for controller, associated power supply and other ancillary control components shall be finished steel or rigid plastic with hinged door and keyed lock. Electronics shall be removable for protection during mounting of panel.

2.04 DDC CONTROLLER SOFTWARE

A. Operating system shall work in real time, provide prioritized task scheduling, control time programs, monitor DDC controller communications, scan inputs and outputs, and contain built-in diagnostics.

B. Input/output point processing shall include the following:

1. Continuous update of input and output values and/or conditions. All connected points are to be updated at least once per second.
2. Assignment of proper engineering units and status condition identifiers to all points.
3. In addition to physical or "hardware" points required, "software" points shall be provided where required for command access and meaningful displays, where required by the "execution" portion of this section or where required on the DDC input/output points lists. "Software" points shall appear identical to physical points in output displays and shall be assignable to text descriptors, logical groups, reports, etc. in the same manner as physical points. "Software" points shall be assigned alarm limits in the same manner as physical points.

C. Command control software shall manage the receipt of commands from control panels, portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.

1. Command delay, programmable from 0 to 2 minutes, shall be provided to prevent simultaneous energizing of large loads. Command delays shall be honored throughout the BAS DDC network, not just within the DDC controller. Delays shall be assignable on an individual per point basis.
2. Each command shall be assigned a command and residual priority to manage contentions created by multiple programs having access to the same command point. Only commands with a higher command priority than the existing residual priority shall be permitted to execute. Whenever a command is allowed to execute, its assigned residual priority shall replace the existing residual priority.
3. A "fixed mode" option shall be supported to allow inputs to, and outputs from DDC control programs to be set to a fixed state or value. When in the "fixed mode," inputs and outputs shall be so noted in all reports.
4. A "last user" record is to be maintained to positively identify which program or manual command is in control of a given point. The last user information shall be displayed and printed along with other point data of logical groups.

D. Provide self-test procedure. Notify remote Operator Workstation (when applicable for project) for maintenance, performance, software, cable break, or data transmission problems. Identify variables as reliable or unreliable. Variables identified as unreliable shall use default in calculation.

E. Alarm Processing

1. High/Low Alarm: Analog input alarm comparison with the ability to assign two individual sets of high and low limits (warning and actual alarm) to an input. Each alarm shall be assigned a unique differential to prevent a point from oscillating into and out of alarm. Alarm comparisons are to be made each scan cycle.
2. Floating Alarm: Where analog controlled values are automatically varied by software (such as hot water temperature reset), a single set of alarm limits shall be provided for those varying values.

These alarm limits shall then "float" a user definable differential above and below the varying setpoint value.

3. Abnormal Alarm: When a digital input is not in agreement with the commanded state of its associated output point, or when a digital input is not in its normal state, an abnormal alarm shall be generated. Abnormal "on" shall cause an alarm, as well as abnormal "off." Alarm time delay for digital inputs to prevent nuisance alarms shall be provided. Each digital input alarm time delay shall be adjustable from zero to two minutes in one-second increments.
4. Alarm lockout shall be provided to positively lock out alarms when equipment is turned off or when a true alarm is dependent on the condition of an associated point. Lockout points and lockout initiators shall be operator programmable. On initial startup of air handler and other mechanical equipment, a "timed lockout" period shall be assigned to analog points to allow them to reach a stable condition before activating alarm comparison logic. Timed lockout period shall be programmable on a per point basis from 0 to 90 minutes in one-minute increments.
5. The capability of automatically initiating commands upon the occurrence of an alarm.

F. Totalization
1. Run time shall be accumulated based on the status of digital input points. It shall be possible to totalize either on time or off time up to 10,000 hours with one-minute resolution. Run time counts shall be resident in memory and have DDC controller resident run time limits assignable through portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.
2. A transition counter shall be provided to accumulate the number of times a device has been cycled on or off. Counter shall be capable of accumulating 600,000 switching cycles. Limits shall be assignable to counts to provide maintenance alarm printouts.
3. Analog totalization capability shall be provided to allow the totalization of electricity, air, water and steam flow, etc. These flows shall be totalized with respect to time and converted to the appropriate energy unit. It shall be possible to automatically set time intervals for totalization, adjustable from one second to 365 days. The totalization program shall keep track of the maximum and minimum instantaneous analog value measured during the period, including the date and time at which each occurred.

G. DDC Controller Programming / Configuration
1. All DDC controllers shall be fully programmable or configurable per required controller application type. DDC controllers which require remote or factory programming or configuration are not acceptable. DDC controllers with custom programs which may not be modified by the user are not acceptable. "Custom" programming shall mean allowing the alteration of actual control logic, and shall not be limited to allowing only the alteration of setpoints, gains, parameters, time constants, etc.
2. DDC controllers shall be provided to meet the control strategies as called for in the sequences of operation on the drawings. If a configurable application specific DDC controller cannot meet this requirement, a DDC fully programmable controller shall be provided.
3. All DDC controller setpoints, gains, parameters, time constants, etc., associated with DDC controller programs shall be available to the operator for display and modification via portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.
4. Each DDC controller shall have resident in its memory and available to the programs a full library of DDC algorithms, intrinsic control operators, and arithmetic, logic and relational operators for implementation of control sequences. Functions to be provided shall include, but not be limited to, the following:
    a. Mathematical: Absolute value, calculate, square root, power, sign, average, totalize.
    b. Logic: OR, AND, compare, negate.
    c. Fixed Formula: High and low select, span, rate, ramp, enthalpy, wet bulb, dew point, relative humidity, humidity ratio, and filter.
    d. Data Manipulation: Store, file and set.

e. Control Routines: Real-time based functions, proportional control, proportional-integral control, proportional-integral-derivative control, adaptive control (self-tuning), direct-acting, reverse acting, feedforward, fixed setpoint, calculated setpoint, adjustable setpoint, lead lag, hysteresis correction, event initiation/ software interlock.

H. Building Automation System program applications (as required for controllers)

1. Time of day scheduling: Allow the creation and maintenance of operating schedules for selected points based on time of day and holiday scheduling. At least two independent start and stop times per day for each system shall be allowed. Each point shall be allowed to have a unique time program, or points shall be able to be grouped and assigned to a common time program. Both digital and analog output points shall be able to be assigned to a time program. This software shall work in conjunction with the time of day scheduler software at the remote Operator Workstation (when applicable for project). This program shall also work in conjunction with the optimum start and optimum stop application software.
2. Optimum Start: Start equipment based on outdoor temperature, space temperature, and system response to minimize energy usage and to assure that comfort conditions are reached exactly at scheduled occupancy time (occupancy schedules are defined under "Time Of Day Scheduling"). This program shall operate in both the heating and cooling cycles. An adaptive algorithm shall be employed which automatically adjusts the start time according to previous performance and shall automatically assign longer lead times for weekend and holiday shutdowns.
3. Enthalpy Optimization: Using standard psychrometric calculations, automatically determine which air source, outdoor air or return air, presents the least total heat load, and automatically adjust mixed air damper position. When outside enthalpy exceeds return air enthalpy, the outside air damper shall go to its minimum position. Typically, the outside air damper must be in its minimum position before the cooling coil valve is allowed to open.
4. Duty Cycle: Periodically cycle electrical equipment to reduce energy consumption and/or energy demand. Each load shall be assigned a cycle interval and an off period. A load leveling algorithm shall be utilized to assure that cycle periods do not coincide.
5. Demand Limiting: Distributed power demand program shall be based on a sliding window instantaneous demand algorithm. The DDC controller(s) connected to the demand meter shall calculate the demand, forecast the demand trend, compare it to established demand limits, and initiate load shedding action or reestablishment of loads as required. Shedding shall be on a sequential basis with least important loads shed first and restored last. Restoration cycle shall add the most important loads first. DDC controllers on the network shall each have a four-tier shed table for assignment of sheddable loads. When a request is issued to the network to shed a specific number of kilowatts, each DDC controller shall shed Tier 1 loads, Tier 2 loads, etc. until the shed requirement is met. The program shall have the capability to sum the readings from multiple meters connected to multiple DDC controllers on the network, and to shed various loads from multiple DDC controllers on the network.
6. Warm-Up: Position the outside air dampers in an adjustable (minimum) position, and trigger a digital output(s) normally used to signal air terminal units to move to their maximum flow settings. When the desired space temperature is reached, as determined by feedback from space temperature sensor(s), the digital output shall return the air terminal units to their normal operation. When occupancy time is reached, the outside air dampers shall be controlled by the normal occupied mode control sequence. During the warm-up cycle, the outside air damper shall be set at the position which minimizes outside air intake while preventing over/under pressurizing of ductwork. This program shall work in conjunction with the time scheduling program and/or the optimum start program as required.
7. Night Cycle: Cycle HVAC equipment on and off as required to maintain an operator selectable unoccupied space temperature. During the equipment "on" time, the outside air damper shall be maintained in an adjustable position which minimizes outside air intake while preventing over/under pressurization of ductwork. The equipment shall be cycled such that energy reduction during unoccupied periods is uniform.

8. Night Purge: Night Purge program shall apply to cooling cycle only. Night Purge shall introduce 100% outdoor air any time the outdoor air is above 50 degrees F, the space temperature is above 75 degrees F, the outdoor air temperature is below space temperature and the outdoor air dew point is less than 60 deg F. Purging shall stop when outdoor air is below 50 deg F, or space temperature is below 75 deg F, or outdoor temperature is less than 5 deg F cooler than space temperature, or outdoor air dew point is greater than 60 deg F.
9. Reset Optimization: Adjust equipment discharge setpoints based on one of the following criteria:
    a. By sensing the worst case requirements (e.g., the zone requiring the most heating or cooling and providing only the minimum energy required to meet the load.
    b. Adjusting the setpoint in direct proportion to another sensed variable (e.g., reset supply water temperature based on outside temperature).

2.05 DDC INPUT/OUTPUT SENSORS

A. Air Static/Differential Pressure Transmitters:
1. Variable capacitance type with ranges not exceeding 150 percent of maximum expected input. Transmitter shall have zero and span adjustments.
2. Safe overpressure rating shall be minimum 5 times the range.
3. Temperature compensated with thermal error of not greater than 0.04 percent of full scale in temperature range of 40 to 100 deg F.
4. Accuracy: +/- 0.5% of full scale including calibration error, repeatability, hysteresis, and yearly drift.
5. Manufacturers:
    a. Air Monitor.
    b. Belimo.
    c. Dwyer.
    d. Modus
    e. Setra.

B. Carbon Dioxide Sensors:
1. Carbon dioxide sensing cell shall consist of a nondispersive infrared carbon dioxide gas cell that uses a pulsed source and has no free air optical path. Output shall be linearized 4-20 mA with the 24 VDC input. In addition, the unit shall be capable of providing SPDT switching of an external low voltage circuit at an adjustable setpoint. The unit shall be specifically designed for the wall or duct application specified. Return air aspiration boxes shall be designed by and approved by the manufacturer. Unit shall have single point setpoint and span adjustment. The unit shall have no moving parts.
2. Power for the sensor shall be extended from a transformer or adaptor installed adjacent to the DDC controller enclosure panel, and shall be run parallel to the 4-20 mA signal cable.
3. Minimum sensing range shall be 0-2,000ppm.
4. Overall Accuracy shall be 3% of full scale including calibration error, repeatability, hysteresis and yearly drift.
5. Minimum calibration interval shall be 5 years.
6. Contractor shall provide all necessary equipment and test gas for calibration and shall calibrate all CO_2 sensors in accordance with the manufacturer's recommendations.
7. Manufacturer:
    a. Specified BAS product where available that meets the requirements herein.
    b. Belimo.
    c. TelAire.
    d. Vaisala.
    e. Veris.

C. Current Sensors:
1. Split-core or donut type transformer for monitoring AC current, with analog output signal as indicated. Current sensors used on motor side of variable frequency drives shall have low frequency detection capability.
2. Analog sensors shall have accuracy of ±1% full scale.
3. Manufacturers:

a. ACI.
b. Johnson Controls.
c. Senva.
d. Veris Industries.

D. Current Switches:
1. Split-core or donut type transformer for monitoring AC current, with digital output signal. Current switches used on motor side of variable frequency drives shall have low frequency detection capability.
2. For Electronically Commutated Motor (ECM) applications: Current switch shall be rated for ECM operation with amperage trip setting higher than trickle/idle/standby amperage with ECM off and amperage trip setting lower than minimum speed setting. Verify minimum amperage expectation for equipment with equipment suppliers to select appropriate current switch from list of approved manufacturers as their minimum trip settings vary from 0.15A to 0.5A.
3. For induction motor applications (as applicable): Current switch shall have adjustable trip setting to accommodate VFC minimum speed settings, to detect fan belt loss, or to detect pump coupling detachment. Set trip setting at approximately 90% of normal motor operating amperage.
4. Manufacturers:
a. ACI.
b. Johnson Controls.
c. Senva.
d. Veris Industries.

E. Differential Pressure Transmitters (Commercial Version):
1. Transmitters used for measuring differential pressure only:
a. Each differential pressure transmitter shall be selected and calibrated for operations between 0 and 200% of the normal differential pressure. The calibration point shall be rounded upward to the nearest 10 inches of water column (for spans less than 200" W.C.) or to the nearest 5 psi for larger spans. Calibration date shall be included on an embossed tag attached to each transmitter.
b. The accuracy, including linearity, hysteresis and repeatability, of the transmitter for measuring differential pressure shall be better than 2% of the span stated above throughout a 4:1 turndown.
c. The transmitter shall not be damaged by pressures of up to 500 psig on either side of the transmitter and all wetted parts shall be essentially inert in the presence of up to a 40% concentration of ethylene or propylene glycol in water.
d. Provide a drain valve for each side of the pressure chamber. Furnish and install mounting brackets appropriate for the installation location.
e. Span and zero shall be individually adjustable.
f. With LCD Display.
g. Manufacturers:
1) Belimo.
2) Dwyer.
3) Setra.
4) Veris Industries.

F. Differential Pressure Transmitters (Industrial Version):
1. Transmitters used for measuring flow rates:
a. Each differential pressure transmitter shall be selected and calibrated for operations between 0 and 125% of the normal differential pressure and up to 150 psig line pressure. The calibration point shall be rounded upward to the nearest 10 inches of water column (for spans less than 200" W.C.) or to the nearest 5 psi for larger spans. Calibration date shall be included on an embossed tag attached to each transmitter.
b. The accuracy, including linearity, hysteresis and repeatability, of the transmitter for measuring differential pressure shall be better than 0.25% of the span stated above throughout a 6:1 turndown.

c. The transmitter shall not be damaged by pressures of up to 1000 psig on either side of the transmitter and all wetted parts shall be essentially inert in the presence of up to a 40% concentration of ethylene glycol in water.
d. Provide a drain valve for each side of the pressure chamber. Furnish and install mounting brackets appropriate for the installation location.
e. Span and zero shall be individually adjustable.
f. Manufacturers:
1) Tobar.
2) ITT Barton.
3) Yokogawa.
4) Taylor.
5) Rosemount.
6) Honeywell Industrial Division.
7) Foxboro.
8) SOR.

2. Transmitters used for measuring differential pressure only:
a. Each differential pressure transmitter shall be selected and calibrated for operations between 0 and 200% of the normal differential pressure. The calibration point shall be rounded upward to the nearest 10 inches W.C. (for spans less than 200" W.C.) or to the nearest 5 psi for larger spans. Calibration date shall be included on an embossed tag attached to each transmitter.
b. The accuracy, including linearity, hysteresis and repeatability, of the transmitter for measuring differential pressure shall be better than 2% of the span stated above throughout a 4:1 turndown.
c. The transmitter shall not be damaged by pressures of up to 500 psig on either side of the transmitter and all wetted parts shall be essentially inert in the presence of up to a 40% concentration of ethylene or propylene glycol in water.
d. Provide a drain valve for each side of the pressure chamber. Furnish and install mounting brackets appropriate for the installation location.
e. Span and zero shall be individually adjustable.
f. Manufacturers:
1) Tobar.
2) ITT Barton.
3) Yokogawa.
4) Taylor.
5) Rosemount.
6) Honeywell Industrial Division.
7) Foxboro.
8) SOR.

3. Indication Gauges for Differential Pressure Transmitters:
a. Each transmitter shall come with an indicating gauge which reads in gpm or inches of water (whichever is the final value desired). The gauge may be either an analog differential pressure gauge piped in parallel to the transmitter or a digital display wired directly to the output of the transmitter.
b. The analog pressure gauge shall be selected and calibrated for the same span as the transmitter it serves.
c. The accuracy, including linearity, hysteresis and repeatability, of the gauge for measuring differential pressure shall be better than 3% of the span stated above throughout its span. Calibration data shall be included on an embossed tag attached to each gauge.
d. The gauge shall not be damaged by pressures of up to 500 psig on either side of the gauge and all wetted parts shall be essentially inert in the presence of up to 40% concentration of ethylene or propylene glycol in water.

e. Scale shall be a minimum of 4.5" long. Furnish and install two bleed fittings for each gauge and mounting brackets appropriate for the installation location.

4. Three Valve Manifold:
   a. Provide a three-valve manifold for each transmitter. The manifold shall not be damaged by pressures of up to 500 psig and all wetted parts shall be essentially inert in the presence of up to a 40% concentration of ethylene glycol in water.
   b. The manifold shall be designed for direct mounting on the transmitter it serves and utilize quarter-turn valves to provide zeroing, blocking and normal service modes.

G. Humidity Sensors:
1. Elements: Thin film or polymer capacitive type or bulk polymer resistance type with linear output, accurate within ± 2% RH throughout the range of 10-95% RH and drift to be less than +/-0.25%.
2. Humidity sensors shall be resistant to chlorine and other cleaning agents.
3. Room Sensors: With locking cover matching space temperature sensors used.
4. Duct Sensors: With duct probe and mounting plate.
5. Manufacturers:
   a. Specified BAS product where available that meets the requirements herein.
   b. Belimo.
   c. GE Industrial, Sensing (formerly General Eastern)
   d. Rotronic.
   e. Vaisala.
   f. Veris – HD/HO Series.

H. Outside Air Flow (low velocity) Differential Pressure Transmitters:
1. The transmitters shall be capable of receiving signals of static, velocity and reference pressures, amplifying and scaling the resulting differential pressure signal to produce a 4-20 mA output signal linear to differential pressure. The transmitters shall have manual zeroing capability.
2. The differential pressure transmitters shall not be affected by over-pressurization up to 1 psig, and shall be furnished with a factory calibrated span and automatic zeroing circuit. The transmitters shall be housed in an enclosure with integral terminal box and with power and output signal conduit connection ports and separate access plate.
3. Calibrated span: shall not exceed 150 percent of maximum expected input.
4. Reference Accuracy: ± 0.50% of span.
5. Hysteresis and dead band (combined): Less than 0.2% of span.
6. Repeatability: 0.15% of span.
7. Linearity: ± 0.25% of span.
8. Include LCD Display.
9. Manufacturers:
   a. Air Monitor-Veltron DPT 2500 Plus.
   b. Custom Electronics Systems.

I. Outside Air Temperature/Humidity Combination Transmitters:
1. Dual transmitters housed in a single hinged enclosure with integral probes configured for exterior wall mount application with PVC sun shield. Unit shall provide separate 4-20 mA signals for temperature and humidity measurement.
2. Temperature sensor: Refer to Temperature Sensors specifications. Range of operation shall be -25 degrees F to 125 degrees F.
3. Humidity sensor: Refer to Humidity Sensors specifications. Range of operation shall be 0-100% RH.
4. Manufacturer:
   a. Belimo.
   b. Vaisala.
   c. Veris.

J. Temperature Sensors:

1. Resistance temperature detectors (RTD) with 1000 ohm, thin-filmed platinum, nickel or balco element having 0.000385 temperature coefficient meeting the input requirements of the DDC controller.
2. Thermally sensitive resistors (thermistor) shall be 10k-type, epoxy or glass coated, having NTC characteristic, meeting the input requirements of the DDC controller.
3. Initial calibration accuracy shall be +/- 0.5 deg F over the entire range. Range shall be as indicated below, or as appropriate to the application.
4. Additional error such as repeatability, stability, tolerance, linearity and hysteresis shall not exceed an additional +/- 0.5 deg F additive (using RMS method) throughout the selected operating range for the application.
5. Temperature sensors shall be resistant to chlorine and other cleaning agents
6. Single point duct mounted sensors shall have 18" rigid probe and calibrated span of 20 - 120°F.
7. Averaging duct mounted sensors shall have 25' long averaging element and calibrated span of 20 - 120°F.
8. Liquid immersion sensors shall have welded stainless steel thermowells for ferrous pipe and brass thermowells for copper pipe. Length of sensor and thermowell shall be selected based on the diameter of the pipe to provide accurate, reliable and homogeneous sensing of the liquid temperature. Thermowell pressure rating shall meet or exceed the system minimum pressure rating. Sensors for chilled water application shall have calibrated span of 20 - 120°F. Sensors for hot water applications shall have calibrated span of 40 - 240°F
9. Room sensors shall have locking cover and a minimum span of 40 - 90°F.
10. Outside air temperature (only) sensors shall have watertight inlet fitting and shall be shielded from direct rays of sun and wind.
11. Manufacturers:
    a. Specified BAS product where available that meets the requirements herein.
    b. ACI – except PT1000 averaging sensor.
    c. BAPI – Basys Series.
    d. Belimo.
    e. MAMAC
    f. Minco.
    g. TCS.

K. Humidity, Temperature & Dew Point Sensor / Transmitters (HVAC High Performance Grade):
1. High performance Humidity, Temperature & Dew Point measurement with accuracy of +/- 0.8 % RH. Sensor range 0-160°F, 0-100%RH.
2. Removable probe for calibration purposes. Provide 1 extra probe for every 4 sensor/transmitter units required for project.
3. With two configurable and scalable outputs: 0-1V, 0-5V, 0-10V, 4-20mA for humidity, temperature and/or dew point readings.
4. Wall or duct mounted as indicated.
5. Provide display option where indicated.
6. Transmitter power supply options for 24VDC, 24VAC as required.
7. Provide weather shield for outdoor senor installations.
8. Provide guards for indoor installations as indicated on drawings.
9. Provide product software (where applicable) for transmitter configuration and probe calibration.
10. Manufacturers:
    a. Rotronic, HygroFlex5 transmitter with HC2-S probe and HW4 product software.
    b. Approved Equal.

L. Dew Point Sensor / Transmitters (Lab & Industrial High Performance Grade):
1. High performance chilled mirror technology with accuracy of +/- 1°F. Sensor range 0-160°F.
2. Wall or duct mounted as indicated.
3. Transmitter power supply options for 24VDC, 24VAC, 115VAC as required.
4. Provide weather shield for outdoor senor installations.

5. Provide guards for indoor installations as indicated on drawings.
6. Manufacturers:
    a. Omega RHCM Series.
    b. Approved Equal.

2.06 DDC DATA COMMUNICATIONS NETWORK

A. Data communication network shall be provided to allow data exchange between the BAS field level DDC controllers and the Building Network Supervisory Controller.

B. The BAS/DDC system-wide communication network shall consist of a primary peer-to-peer network, and at the Contractor's option, secondary sub-networks linked to the primary network. The primary network shall support peer-to-peer communications between primary network BAS field level DDC controllers. The Building Network Supervisory Controller shall be connected to the primary network. Secondary sub-networks when used shall interface with the primary network though the primary network BAS field level DDC controllers. At least one DDC controller connected to the primary peer-to-peer network shall be provided in each mechanical room, or as indicated on the drawings.

C. Data communications media shall be twisted pair wires.

D. The communications network shall allow shared point and control information between BAS field level DDC controllers. All required repeaters, hubs, active links, gateways, etc. and associated power supplies shall be provided as required to provide shared point and control information between BAS field level DDC controllers.

E. Failure of any individual BAS field level DDC controller shall not cause the loss of communications between peer BAS field level DDC controllers.

F. All data transmitted must be positively acknowledged as received or negatively acknowledged as not received. Negative acknowledgments shall cause a retransmission of the data. Network connected devices must send a "functioning" message each network cycle. Lack of a "functioning" message after successive retries shall constitute a device failure and shall be recognized as such by the network.

G. Error recovery and communication initialization routines shall be resident in each network connected device.

2.07 CONTROL VALVES AND VALVE OPERATORS

A. Pressure Independent Control Valves (2-way):
    1. Up to 2 inches: Characterized ball valve or Globe valve style with integral pressure compensating cartridge which maintains a constant pressure drop across valve seat while providing equal percentage flow control. Ball valve construction shall include bronze or brass-nickel plated body with screwed ends, stainless steel or chrome plated brass ball, characterizing disc, stainless steel or brass stem, and resilient reinforced Teflon seats. Globe valve construction shall include bronze or AMETAL (a dezincification alloy of TA), stainless steel or brass stem and EPDM type seats.
    2. Over 2 inches: Control valve with integral pressure compensating spring and diaphragm which maintains a constant pressure drop across the valve seat, iron body with flanged ends, stainless steel trim.
    3. Accuracy: Control valves shall accurately control flow from 0 to 100% of the full rated flow. Flow through the valve shall not vary more than +/- 5% due to system pressure fluctuations when the pressure drop across the valve is within the range of 5 psid to 35 psid.
    4. Manufacturers:
        a. Belimo.
        b. Bray / Delta Control Products.
        c. Danfoss Nexus Valve.
        d. Griswold.
        e. Honeywell.
        f. Johnson Controls.
        g. Siemens.
        h. Tour Anderson.

B. Globe Valves (2-way & 3-way):
    1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, single seated, screwed ends with backseating capability, repackable under pressure.

2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc, repackable under pressure.
3. Valve stem packing shall be tetrafluorethylene, spring loaded and self-adjusting. Packless construction is acceptable.
4. Manufacturers:
    a. Belimo.
    b. Bray / Delta Control Products.
    c. Dodge Engineering & Controls, Inc.
    d. Honeywell.
    e. Schneider Electric Controls.
    f. Johnson Controls.
    g. Siemens.

C. Butterfly Pattern: Refer to Division 20 Section "Valves" for valve body and trim requirements.

D. Electric Operators:
1. Operators shall be electronic type to accept signals from direct digital controller or modulating thermostat for proportional control.
2. Valves shall spring return to normal position as indicated. Terminal unit tempering coil control valve operators are not required to be spring return.
3. Select with sufficient shut-off power for system pressure and highest operating torque, and torque requirements of valves which may stick because of infrequent use.
4. Select to provide smooth proportioning control under operating conditions normal to the system.
5. Electric Butterfly Control Valve Actuators: Permanent split capacitor, reversible electric motor which drives a compound epicyclic gear, thermal overload protection, factory tested, factory lubricated, localized mechanical position indicator readable at 25 feet, 0-90 degree reversible operation, bolt directly to valve top plate. Housing shall be weatherproof and suitable for outdoor location. Provide thermostatically controlled heater for prevention of condensation at low temperatures, 120 VAC. Actuator ambient temperature range shall be -20 degrees F to +140 degrees F. Provide separate limit switches which close at the full open and full closed position, respectively. Actuator shall include a manually operated handwheel for manual override of the valve position.

E. Hydronic Systems:
1. Valve minimum pressure rating shall meet or exceed the system minimum pressure rating as noted for each system in Division 20 Section "Valves," and in Division 23 Section "Hydronic Piping."
2. Valve minimum temperature ratings shall be 250 deg F.
3. For globe valves: Replaceable plugs and seats of stainless steel or brass, selected for maximum lift under application conditions.
4. Two way and three way valves shall have equal percentage characteristics. Size two way valve operators to close valves against pump shut off head.
5. Pressure independent control valves shall be used for 2-way applications unless otherwise indicated. Select to achieve scheduled flow rate of the associated heat transfer device. If the scheduled flow rate is too high to achieve with one valve, provide multiple valves sized at flow divided equally of the scheduled flow rate and control all valves in unison - coordinate control valve quantity and the need for parallel piping of control valves with mechanical contractor.
6. Pressure Drop for pressure dependent characterized ball and globe valves: Select Control valves that result in a pressure drop at or as close as possible to scheduled information. If not scheduled, primary HVAC equipment and terminal equipment control valves shall be selected for a pressure drop close as possible to 11.5 feet of head. TC Contractor shall use control valves that meet the pressure drop requirements from manufacturers listed above.

2.08 DAMPERS - AUTOMATED

A. Performance: Test in accordance with AMCA 500.

B. Frames: Galvanized steel, minimum 16 gauge, minimum 2 inches in width, welded or riveted with corner reinforcement for 12 gage structural equivalence.

C. Blades: Galvanized steel, minimum 14 gauge, maximum blade size 8 inches wide, 60 inches long, attached to minimum 1/2 inch shafts. Dampers which are required to have a static pressure rating over 4 inch W.G. shall have minimum 3/4 inch solid shafts.
D. Blade Seals: Synthetic elastomeric or Neoprene, mechanically attached, field replaceable.
E. Jackshafts (where required): Minimum 1/2 inch galvanized steel.
F. Jamb Seals: Stainless steel.
G. Bearings: Oil impregnated sintered bronze or lubricant free, solid stainless steel. Provide thrust washers at bearings for all dampers which are to be mounted with blades in the vertical position.
H. Linkages: Accessible for maintenance. Linkages may be located in airstream. Linkages located in damper frame shall be external to the duct, accessible for maintenance. Linkages located in the airstream shall be zinc-plated.
I. Leakage: Less than 8 CFM per square foot based on 4 inches W.G. pressure differential.
J. Static Pressure Rating: As scheduled on the drawings, or if not scheduled, minimum 4" W.G.
K. Maximum Velocity: As scheduled on the drawings, or design for maximum velocity to be encountered in location where installed.
L. Temperature Limits: -40 to 200 deg F.
M. Manufacturers:
    1. American Warming & Ventilating.
    2. Arrow United Industries.
    3. Greenheck.
    4. Honeywell.
    5. Johnson Controls.
    6. Louvers & Dampers, Inc.
    7. Ruskin.
    8. Tamco.
    9. Vent Products.

2.09 DAMPERS, INSULATED OUTDOOR AIR / RELIEF AIR / EXHAUST AIR - AUTOMATED

A. Performance: AMCA certified for Air Performance and Air Leakage.
B. Frames: Extruded aluminum, .080-inch thickness minimum, 4 inches deep minimum, thermally broken, and insulated with polystyrene or polyurethane foam insulation.
C. Blades: Extruded aluminum, internally insulated, and thermally broken. Maximum blade size 8 inches wide, 60 inches long.
D. Shafts: Minimum 7/16 inch hexagonal or square corrosion resistant zinc plated steel.
E. Blade Seals: Extruded EPDM, silicone, or synthetic elastomeric, mechanically attached.
F. Jamb Seals: Silicone, or synthetic elastomeric, mechanically attached.
G. Bearings: Dual bearing assembly of durable synthetic polymer resulting in no metal-to-metal contact. Provide thrust washers at bearings for all dampers which are to be mounted with blades in the vertical position.
H. Linkage: Linkage shall be installed in the frame side and shall be constructed of aluminum and/or corrosion resistant zinc plated steel.
I. Leakage: Less than 3 CFM per square foot at 1 inch W.G. pressure differential at minus 40 deg F.
J. Static Pressure Rating: As scheduled on the drawings, or if not scheduled, minimum 4 inches W.G.
K. Maximum Velocity: As scheduled on the drawings, or design for maximum velocity to be encountered in location where installed.
L. Temperature Limits: Minus 40 to 155 deg F.
M. Manufacturers:
    1. Greenheck ICD-45.
    2. Ruskin TED50 Series.
    3. Tamco Series 9000 BF.

2.10 DAMPER OPERATORS - ELECTRIC

A. Electric damper motor shall be 24 or 120 volt two-position or modulating as required with spring return type and sized to operate the damper with sufficient reserve power for smooth operation from full close to full open and tight shut-off. Damper motor shall have "O ring" gaskets for weatherproof operation.

B. Number: Sufficient to achieve unrestricted movement throughout damper range. Provide sufficient number of operators such that one operator does not operate more than the maximum square footage of damper area as recommended in standard catalog of manufacturer.

C. Manufacturers:
   1. Belimo.
   2. Delta Control Products.
   3. Honeywell.
   4. Schneider Electric Controls.
   5. Johnson Controls.
   6. Siemens.

2.11 DIFFERENTIAL PRESSURE SWITCHES

A. Shall provide electrical switching action upon a sensed pressure differential increase between two sensed points. Sensitivity shall be suitable for the application. Setpoint shall be adjustable over the full range of the device. Switching action shall open or close two independent single-pole, double-throw (SPDT) switches. Electrical switch rating shall be based on the application and circuit voltage

B. Pressure rating of switch/connecting tubing and reset type:
   1. Filter pressure drop - Rated for 2 inches w.g. Provide automatic reset type.
   2. Duct static pressure - Rated for 10 inches w.g. Provide manual reset type when used for high limit cutout safety.

2.12 ELECTRICAL REQUIREMENTS FOR CONTROLS WORK

A. Electrical accessories such as relays, switches, contactors and control transformers shall meet the requirements of the Division 26 Specifications of respective project.

B. Electrical wiring and conduit shall meet the requirements of the Division 26 Specifications.

C. All control wiring in mechanical rooms and any other exposed areas shall be run in conduit. Low voltage temperature control wiring in concealed accessible locations (i.e. above lay-in ceilings), as well as low voltage temperature control wiring within partitions, may be run using plenum rated cable, neatly tie-wrapped and fastened to the building structure (not to ceiling or ceiling support wires).

D. Conduits carrying control wiring shall be sized for a maximum fill of 40% of capacity.

E. Where raceway is required, two separate raceway systems shall be provided; one for A.C. wiring and the other for D.C. wiring.

F. Data transmission cabling and equipment grounding procedures shall meet the latest FCC guidelines for electromagnetic field generation.

G. All control wiring sizes and types shall meet or exceed the equipment manufacturer's recommendations.

H. TC Contractor shall provide 24V power supply transformers for TC Contractor provided controllers. Maximum Transformer circuit for controls shall be 100VA serving controllers within mechanical room control panels or for remote terminal unit controllers served from common 24V power supply circuit. Transformers shall be located within enclosures provided by TC Contractor.

2.13 INDICATING GAUGES - DUCT STATIC PRESSURE

A. 4" diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, scale as indicated on drawings or as appropriate for application, suitable for surface or flush mounting. Accuracy ± 2 % of full scale.

B. Where indicated on drawings, gauge shall incorporate high and low pressure switches. Switches shall be front adjustable over the full range of the gauge with pointers and with adjustable deadband to 1% of full scale. Separate electrical contacts shall close upon reaching the high or low pressure setpoints.

C. Manufacturer:
   1. Dwyer "Magnehelic" or "Photohelic."

2.14 LIMIT SWITCHES

A. Oil tight type with operator as required providing required function. Limit switches used on dampers should be set at approximately 75% of full stroke.

B. Manufacturers:
   1. Allen-Bradley.
   2. General Electric.
   3. Square D.

4. Westinghouse.
5. Micro-switch.

2.15 LOCAL AND AUXILIARY CONTROL COMPONENT ENCLOSURE PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, pushbuttons and switches flush on cabinet panel face, or as detailed on drawings. Provide panel with locking door.

B. ANSI/NEMA 250, general purpose utility enclosures with enameled finished face panel, or as indicated on the drawings.

C. Panels shall be sized for a maximum fill of 50% capacity, and shall not be smaller than 24" X 24".

2.16 THERMOMETERS - AIRSTREAM

A. ASTM E1, 4 inch diameter dial in stainless steel or drawn steel with enamel finish case, vapor or liquid actuated with brass or copper bulb, copper or bronze braided capillary of sufficient length and with necessary bulb supports within airstream, white with black markings and black pointer, unbreakable lens, 1 percent scale accuracy. Maximum scale divisions shall be 2 deg F. Select scale ranges such that all expected temperatures are within the range but such that the range does not extend beyond the extremes more than 25 degrees.

B. Manufacturers:
1. Trerice.
2. Weksler.
3. Marsh.
4. Honeywell.
5. Schneider Electric Controls.
6. Johnson Controls.
7. Siemens.

2.17 THERMOSTATS – ELECTRONIC & ELECTRIC

A. Electronic Floating Control Room Thermostats: Microprocessor based tri-state (floating)proportional thermostat providing individual room control with setpoint adjustment, locking cover and range stops, output status LED's, night setback/setup feature with local override switch. Manufacturer: Honeywell, Model T6984 or similar.

B. Electronic Modulating Control Room Thermostats: Microprocessor based modulating 2-10V DC thermostat providing individual room control with setpoint adjustment, locking cover and range stops, output status LED's, night setback/setup feature with local override switch. Capable of single and dual modulating outputs to meet required control application. Manufacturer: Honeywell, Model T7984 or similar.

C. Line Voltage Room Thermostats: Adjustable single setpoint with exposed setpoint indicator and exposed thermometer for a range of 55 deg F to 85 deg F with maximum dead band of 1-1/2 degrees F, and locking cover. Contacts shall be rated for load, single-pole or two-pole as required. Provide with integral manual On/Off/Auto selector switch where indicated on control details. Power Requirement: 24 V, ac or 120 V, ac as required.

D. Room Thermostat Accessories:
1. Thermostat Covers: Manufacturers standard with finish as selected by Architect.
2. Insulating Bases: Provide one inch insulating base for thermostats located on exterior walls.
3. Adjusting Key: As required for device.

E. Electric Low Limit Duct Thermostat (freezestat): Snap acting which trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint, fixed 5 deg F differential, range 30 deg F to 60 deg F, requiring minimum 20 feet length of bulb. Manual-reset unless indicated on drawings to be auto-reset type. Provide one thermostat for every 20 sq ft of coil surface. Switch shall be UL listed and rated for 10 amps at 120 VAC. Provide additional switch or contacts for connection to monitoring system.

F. Electric High Limit Duct Thermostat: Snap acting, manual reset switch.

G. Electric; water-immersion type thermostat, for installation in hot-water circulation piping adjustable for control of water circulation pump. Operation of pump to be On or Off upon setpoint as required per control details. Contacts shall be rated for load. Provide transformer for 24 V, ac or 120 V, ac duty as required.

H. Electric; strap-on piping type thermostat for control of fans with hot water heating coils. Operation of fan to be Off when temperature is below setpoint as required per control details. Contacts shall be rated for load. Provide transformer for 24 V, ac or 120 V, ac duty as required

I. Manufacturers for listed Thermostat Types:
   1. Honeywell International, Inc.
   2. Johnson Controls, Inc.
   3. Schneider Electric USA, Inc.
   4. Siemens Industry, Inc.; Building Technologies Division.
   5. White-Rodgers Div.; Emerson Electric Co.

2.18 WATER FLOW SWITCHES

A. UL listed, suitable for all service application conditions. Body minimum working pressure rating shall equal or exceed system pressure rating as noted for each system in Division 22 and 23 piping sections.

B. Manufacturers:
   1. ITT.
   2. Honeywell.
   3. Johnson Controls.

2.19 GAS DETECTION MONITORING SENSORS/TRANSMITTERS (CO & NO2)

A. UL approved carbon monoxide sensor/transmitter shall be capable of detecting carbon monoxide (CO) at a radius of 50 ft. Each transmitter shall produce a 4 to 20 mA analog output over a detection range 0-500 ppm. Transmitter sensor shall be electrochemical with an accuracy of 3% and a 10-step led concentration display (LCD). Sensor must compensate for variations in humidity and temperature to maintain a high level of accuracy. Transmitter shall have a green LED for normal operation and local audible alarm (65 dBA at 3 ft) shall be provided on sensor/transmitter, activated upon 2nd high alarm level which shall be adjustable at control panel. Unit shall operate from 17-27 VAC, 24-38 VDC power. Signal shall be either a 2 or 3 wire. Sensor shall be capable of operating in environmental conditions of 5-90% relative humidity and 32 to 100 deg F temperatures.
   1. Manufacturer:
      a. Vulcain. Model VA-201T-Q1-CO (Michigan Wholesaler for Vulcain Products: Cochrane Supply & Engineering, Madison Heights, MI. (248-588-9260).
      b. Alternate systems subject to approval by engineer.

B. UL approved nitrogen dioxide sensor/transmitter shall be capable of detecting nitrogen dioxide (NO2) at a radius of 50 ft. Each transmitter shall produce a 4 to 20 mA analog output over a detection range of 0-10 ppm. Transmitter sensor shall be electrochemical with an accuracy of 3% and a 10-step led concentration display (LCD). Sensor must compensate for variations in humidity and temperature to maintain a high level of accuracy. Transmitter shall have a green LED for normal operation and local audible alarm (65 dBA at 3 ft.) shall be provided on sensor/transmitter, activated upon 2nd high alarm level which shall be adjustable at control panel. Unit shall operate from 17-27 VAC, or 24-38 VDC power. Signal shall be either 2- or 3-wire. Sensor shall be capable of operating in environmental conditions of 5-90% relative humidity and 32 to 100 deg F temperatures.
   1. Manufacturer:
      a. Vulcain. Model VA-201T-Q1-NO2. (Michigan Wholesaler for Vulcain Products: Cochrane Supply & Engineering, Madison Heights, MI. (248-588-9260).
      b. Alternate systems subject to approval by engineer.

C. Calibration Kit with carrying case shall be provided for carbon monoxide sensors. Two 100-liter tanks shall be provided.
   1. Manufacturer:
      a. Vulcain, Model SKCOQ1. (Michigan Wholesaler for Vulcain Products: Cochrane Supply & Engineering, Madison Heights, MI. (248-588-9260).
      b. Alternate systems subject to approval by engineer.

D. Calibration Kit with carrying case shall be provided for nitrogen oxide sensors. Two 50-liter tanks shall be provided.
   1. Manufacturer:
      A. Vulcain, Model SKNO2Q1. (Michigan Wholesaler for Vulcain Products: Cochrane Supply & Engineering, Madison Heights, MI. (248-588-9260).
      B. Alternate systems subject to approval by engineer.

PART 3 EXECUTION

3.01 INSTALLATION - CONTROL SYSTEMS

A. Install in accordance with manufacturer's instructions.
B. Check and verify location of temperature sensors, thermostats and other exposed control sensors with plans and room details before installation. Locate room temperature sensors and thermostats 48 inches above floor unless noted otherwise.
C. The location of all control-related items to be mounted on the exterior of the building must be approved by the Architect prior to installation. Indicate proposed locations on the shop drawings.
D. Caulk both sides of damper frames to duct walls to prevent leakage between damper frame and duct.
E. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. Sensors used for closed loop control must be connected to the same DDC controller as the associated output signal.
F. Provide conduit and electrical wiring where required.
G. All wiring in altered and unaltered areas shall be run concealed. "Wiremold" in finished areas shall be allowed when wiring cannot be run concealed in walls or partitions. Minimize “wiremold” routing.
H. Splicing of DDC sensor cabling at junction boxes shall not be acceptable.
I. All equipment which has moving parts and is remotely started by the control system shall be provided with warning labels no less than 2 inches in height, and in bright warning color, stating that the equipment is remotely started by automatic controls. Such labels shall be posted clearly in the area of any moving parts, such as belts, fans, pumps, etc.
J. Coil and conceal excess capillary on remote element instruments.
K. Install thermometers in air duct systems on flanges.
L. Install all gauges and thermometers in locations where they are easily read from normal floor level. Provide tubing or wiring as required.
M. Locate all control components and accessories such that they are easily accessible for adjustment, service and replacement.
N. Locate, size and support sensing elements in airstreams so that they properly sense the representative condition. Controlling, transmitting and indicating elements shall be located to sense the average condition. Safety elements shall be located to sense the extreme condition.
O. Locate and size sensing elements in liquid lines so that they are in moving liquid and not in stagnant or turbulent locations. Wells shall not obstruct the flow of the liquid being measured. Pipes one inch and smaller shall be increased at least one pipe size at the point of insertion.
P. Locate pressure sensing taps in liquid lines in straight runs of pipe with at least 10 pipe diameters of straight pipe both upstream and downstream of pressure tap. Provide a shut-off cock in sensing line at each pressure tap.
Q. Install pressure sensing elements in ducts and casings with clean, sharp taps to accurately read true static pressure, avoiding velocity influence and turbulence.
R. Locate, support and install all control components and accessories so that they will not be subject to vibration, excessive temperatures, dirt, moisture or other harmful conditions beyond their rated limitations.
S. Where insulation is penetrated due to the installation of sensing elements or tubing, reseal the openings air and vapor tight. Provide brackets for devices to be located on insulated surfaces so as to clear the finished surface of the insulation and to avoid puncturing the vapor seal.
T. Provide all necessary relays, switches, linkages, control devices, accessories and connections as required for a complete and operational control system as specified herein and shown.

U. All electric valve and damper operators shall be capable of moving from full closed to full open, or vice versa, within 120 seconds.

3.02 TC CONTRACTOR DESIGN & INSTALLATION COORDINATION MEETINGS

A. Temperature Controls Shop Drawing Pre-submittal Meeting: TC Contractor's option to schedule a meeting at the Engineer's Office to review project design documentation for clarification purposes to aide in the TC Contractor development of TC/BAS shop drawings. For simple clarification items, TC Contractor may contact Engineer via telephone to discuss. For project scope questioning items, TC Contractor shall utilize the formal Request of Information (RFI) process.

B. Temperature Controls Shop Drawing Submittal Meeting: Project Design Engineer's option to schedule a meeting at the Engineer's Office to review the TC Contractor's formally submitted drawings to address Engineer's comments and concerns that indicate TC Contractor's shop drawings vary from project design intent. This meeting can be avoided if TC Contractor's shop drawing submittal is complete and Engineer is confident that documents are going to lead to an installation that meets project design intent.

C. Temperature Controls Installation Technician Meeting: Project Design Engineer's option to schedule a meeting at the project site to meet and discuss project expectations with the TC Contractor's field installation technician and/or project manager. Discussion may include

1. Shop drawing review comments to ensure installation technician has the most up-to-date TC submittal.
2. Graphics generation requirements including special Owner requirements and schedule for completion.
3. Owner training agenda and scheduling.
4. TC/BAS system acceptance procedures.

3.03 IDENTIFICATION AND MARKING

A. All sensors, relays, switches, etc. shall be marked with the same identification number as used on the as-built shop drawings. Use Brother P-touch label maker or similar with black text on clear or white super adhesive tape. If label applied in wet environment, spray label with clear enamel for waterproofing.

B. Wire shall be color coded according to functional use. Identify color coding format on record drawings.

C. Identify each wire as to ID number at each controller termination, field device termination or on the field device.

D. All control panels and auxiliary enclosures shall be supplied with engraved phenolic nameplate permanently attached on the front exterior with panel identification to match details of temperature control submittals and include system(s) served and area(s) served on the labeling. Include labeling near 120VAC terminations within panel identifying power source panel ID and specific circuit breaker used.

E. Temperature control conduit and junction box covers shall be painted green to signify that it is used for temperature controls. All junction box covers shall be painted green and the conduit shall be painted with a green mark (approximately 6 inches long) every 36" to 48", and on both sides of all penetrations.

3.04 GRAPHIC DISPLAY GENERATION

A. Provide the following graphic displays as a minimum at the operator interface, arranged in logical penetration paths:

1. Overall campus layout which shows all of the buildings on the Owner's campus.
2. Individual building layout or isometric for each building connected to the system.
3. Floor plans for each floor within each building, with display of present values of space conditions sensed by connected space sensors, display of the name of the air handler associated with each space sensor, display of the room number in which the sensor is located and color coding to indicate whether the sensed space condition is within the acceptable range, is too high, or is too low. TC Contractor shall confirm Owner desired room names prior to graphics generation which may differ from the room names indicated on construction documents.
4. Schematic diagram for each HVAC system. Each system schematic display shall include at least the following:
    a. Schematic arrangement of ductwork, fans, dampers, coils, valves, piping, pumps, equipment etc.
    b. System name.
    c. Area served.

d. Present value or status of all inputs, along with present setpoint.
e. Present percent open for each damper, valve, etc. based on commanded position.
f. Reset schedule parameters for all points, where applicable.
g. Present occupancy mode.
h. Present economizer mode, where applicable.
i. Present outside air temperature.
j. Associated space conditions and setpoints, where applicable.
k. Status of application programs (e.g., warm-up, night cycle, duty cycle, etc.).
l. Color coding to indicate normal and abnormal values, alarms, etc.

5. Manual override capability for each on/off or open/closed controlled digital output (for fans, pumps, 2-position dampers and valves, etc.) and each modulating analog output (for dampers, valves, VFD speed modulation type points, etc) shall be provided. Graphic display of output point auto or manual override status shall be provided.
6. Sequence of operation in written (text) format for each HVAC system.
7. Overall BAS system schematic.
8. System management graphic for each network device and/or DDC controller.

3.05 OWNER INSTRUCTION AND TRAINING

A. Provide a minimum of forty (40) hours of combined on-site and classroom instruction and training to the Owner on the operation of the control systems for the initial installation.
B. Instruction and training shall be performed by a competent Contractor representative familiar with the control systems operation, maintenance and calibration.
C. Training shall take place after check, test, start-up of temperature controls system at a time mutually agreed upon by the Owner and Contractor.
D. Provide computer training & tutorial material on USB Flash Drives 5 total describing operator's BAS graphical interface capabilities and functions.
E. Provide 5 sets of literature pertaining to the operation and maintenance of the DDC system components provided.

3.06 CALIBRATION AND START-UP

A. After installation and connection of control components, test, adjust and re-adjust as required all control components in terms of function, design, systems balance and performance. Make systems ready for environmental equipment acceptance tests.
B. After environmental equipment has been accepted and after the systems have operated in normal service for two weeks, check the adjustment on control components and recalibrate where required. Components not in calibration shall be recalibrated to function as required, or shall be replaced. Control devices, linkages, and other control components shall be calibrated and adjusted for stable and accurate operation in accordance with the design intent and to obtain optimum performance from the equipment controlled. Cause every device to automatically operate as intended to ensure its proper functionality.

3.07 ACCEPTANCE PROCEDURE

A. Upon successful completion of start-up and recalibration as indicated in this section, the Architect shall be requested in writing to inspect the satisfactory operation of the control systems.
B. Demonstrate operation of all control systems, including each individual component, to the Owner and Architect.
C. After correcting all items appearing on the punch list, make a second written request to the Owner and Architect for inspection and approval.
D. After all items on the punch list are corrected and formal approval of the control systems is provided by the Architect, the Contractor shall indicate to the Owner in writing the commencement of the warranty period.

END OF SECTION 23 0933

SECTION 32 13 13

POST-TENSIONED CONCRETE SPORT COURT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Concrete Paving for Sport Court
   2. Post-tensioned Concrete for Sport Court

B. Related Requirements:
   1. 32 17 23 - PAVEMENT MARKINGS
   2. 31 20 00 – EARTH MOVING (See Civil's Plans)

1.2 DEFINITION

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review methods and procedures related to post-tension concrete, including but not limited to, the following:

      a. Concrete mixture design.
      b. Quality control of post-tensioned concrete materials and post-tensioned concrete paving construction practices.
      c. Post-tensioned concrete design.

   2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

      a. Contractor's superintendent.
      b. Post-tensioned concrete paving Subcontractor.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Court contractor shall furnish a Shop Drawing for the Post-tensioned slab. The shop drawing shall be submitted to the Consultant at a minimum of 10 days prior to installation.

C. Design Mixtures: For each concrete paving mixture include alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection, provide a sample to the Consultant.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Post-tension accessories
5. Admixtures.
6. Curing compounds.
7. Applied finish materials.
8. Bonding agent or epoxy adhesive.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Post-tensioned Concrete Qualifications: A firm experienced in the installation and design of post-tensioned concrete slabs with experience and necessary licensure for building sport courts in the state of Michigan.
1. The work shall conform to the standards of the American Sports Builders Association (ASBA) for basketball court construction.
2. All steel tendon installation, concrete work, and stressing of tendons shall be done by selected contractor. This provision intent is to provide continuity and one source responsibility for the integrity of the post-tensioned slabs.
3. Court contractor shall have a minimum of 5 years of experience building post-tensioned concrete courts.
4. The court contractor must provide references for three (3) similar post-tensioned concrete sport courts they have built.
5. Contractor shall have a PTI Level 1 Unbonded Certified Field Technician on site. Proof of certification shall be required of successful bidder.

C. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests must be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.7 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, post-tension reinforcement accessories, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for any curves with a radius of 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 SAND BASE

A. General Requirements: The sand base shall be installed beneath the post-tension concrete slab to provide uniform support, promote drainage, and facilitate proper load distribution. The sand base material shall conform to the following specifications and shall be approved by the project Consultant prior to installation.

B. Sand Material: The sand used for the base shall meet the following criteria:
   1. Sand shall adhere to gradation, fines, and all other standards for MDOT Class II granular material. See Preparation section for compaction rates.

2.4 TENSIONING TENDONS AND ANCHORS

A. Post-tensioning tendons and anchorages shall conform to the “PTI Guide Specifications for Post-tensioning Materials”.

B. The tensioning tendons shall consist of one-half inch (1/2”) diameter, 7-wire, stress relieved tendons, having a guaranteed ultimate tensile strength of 270,000 PSI (270 Kips). Tendons shall conform to ASTM-416. Tendons shall be fabricated to proper length for each slab, coated with a permanent rust preventative lubricant and encased in sheathing. Any damage to sheathing shall be repaired with tape prior to concrete placement. A maximum of six inches (6”) of exposed tendons is permitted at the dead-end anchor. Any damaged tendons shall be removed and replaced prior to concrete pour.

C. Calculations verifying minimum tendon stress required to achieve minimum residual compressive force of 150 psi at center of slab.

D. Anchorage for post-tensioning tendons shall be monotendon-type anchor system with current ICBO approval using a ductile iron casting of at least 2.25 inches by 4.5 inches of bearing. Pocket-formers shall be used on all stressing ends. The pocket-former shall provide adequate concrete coverage for the anchor as required by project details. Coating pocket-formers with oil or similar materials for ease of removal is acceptable. All dead end anchorages shall be shop fabricated, pre-seated wedges. Fabrication and manufacture of the unbonded system shall be in accordance with the guide specifications as outlined by the post-tensioning institute.

E. All tendons shall be supported on plastic chairs and loosely tied as shown in drawings at all intersections (too tightly tied, tendon friction will increase with tensioning) to prevent vertical and horizontal movement during concrete placement. Tendons shall be placed as shown in drawings. See drawing details for spacing.

F. Concrete must be well consolidated, especially in the vicinity of tendon anchorages.

G. Along the thickened perimeter section, the tendons are anchored deeper in the concrete from the surface of the slab. See details for depth. Two #4 rebar lie longitudinally around the court beam directly inside the tendon anchor on top of the tendons. Overlapping should be a minimum of three (3) inches and should not conflict with any anchors.

H. Tendons should undergo a pre-stress and final-stressing per PTI standards and as outlined further in the specifications and drawings.

I. Tendons should be anchored at 28.9 KIPS but may be initially stressed at 33 KIPS. A 12”x36” area should be allowed for stressing equipment clearance near each anchor as shown in the drawings. The stressing process generates tremendous pressures and extreme care should be taken to prevent injury from operator error or failure of equipment or materials.

J. Contractor shall submit shop drawings of tendon layout, spacing and anchoring for approval prior to construction.

2.5 VAPOR BARRIER

A. Use minimum 6 mil thick polyethylene sheeting meeting the requirements of ASTM E 1745.

B. The vapor barrier shall consist of two (2) layers and shall be installed prior to the installation of any steel and/or tendons. Overlap polyethylene sheets at least 12” and tape joints. Once in place, no vehicular traffic should be allowed on the vapor barrier nor any other object which could puncture the barrier or otherwise compromise the integrity of the surface. All concrete shall be placed using a concrete pump-truck.

2.6 STEEL REINFORCEMENT

A. Epoxy-Coated Reinforcing Bars: ASTM A775/A775M with ASTM A615/A61M, Grade 60 (#4) backup bars.

B. Bar Supports: Bolsters, plastic chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

2.7 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project. Fly ash shall not be permitted as a supplementary cementitious material (SCM). The proportion of SCMs shall not exceed 25% of the total cementitious content by weight unless otherwise specified by the Consultant.

1. Portland Cement: ASTM C150/C150M, Portland cement Type I/II

2. Silica Fume: ASTM C1240, 5-10% of the total cementitious content by weight.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

4. The cement shall be stored in a dry, weatherproof facility to prevent moisture absorption and contamination. No cement that has become caked or has deteriorated in any way shall be used.

B. Fine and Course Aggregates:
   1. The fine aggregate shall meet all the requirements of Section 902 of the Michigan Department of Transportation (MDOT) specification for 2NS-Natural Sand.
   2. The course aggregate shall meet all the requirements of Section 902 of the Michigan Department of Transportation (MDOT) specification for No. 6A Coarse Aggregate. Nominal size for concrete work at 5" thickness should not exceed 1 ½".

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

   1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
   2. Retarding Admixture: ASTM C494/C494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water: Potable and complying with ASTM C94/C94M.

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

2.9 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber in preformed strips.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, non-load bearing for bonding hardened or freshly mixed concrete to hardened concrete.

D. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (3 to 6 mm).

2.10 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Fiber Reinforcement:
1. Synthetic Fiber, Monofilament Fibers: Monofilament polypropylene fibers Consultanted and designed for use in decorative concrete paving, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.
   a. The contractor shall provide documentation verifying the fiber complies with the specified standards and is appropriate for use in the post-tensioned concrete application.
2. Fiber Dosage: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd. (0.90 kg/cu. m)
3. Mixing Procedures: Fibers shall be introduced into the concrete mix at the batching plant or directly into the ready-mix truck as per the manufacturer's guidelines. Care shall be taken to ensure even distribution of fibers throughout the mix without clumping. The contractor shall monitor the mixing process to prevent any disruption to the post-tensioning operation and ensure that the workability and ability to finish the concrete are not adversely affected.

C. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa)
2. Maximum W/C Ratio at Point of Placement: 0.45
3. Slump Limit: 4 inches (100 mm)

D. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content, 1-inch (25-mm) Nominal Maximum Aggregate Size: 6 percent plus or minus 1 percent.

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

2.12 PLACING

A. A full court shall be placed in one continuous operation. The post-tensioned concrete slab will be placed with a laser screed capable of providing a surface to ¼" + in 10' at a 1% slope. Finish surface shall not have a water holding area greater than 1/8" deep (cover a nickel). This is to be determined by the flooding the court with water, allowing it to drain for 1 hour on a 70°F or warmer day.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with
3. a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
4. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 31 20 00 "Earth Moving."

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

3.2 PREPARATION

A. Remove loose material from compacted subbase prior to placement of Base Course.

B. Subgrade: The area will be graded to the required depth to accommodate the base and concrete thickness and provide a uniform one percent (1.25%) slope at plus or minus one tenth of a foot (+.1") in one plane as shown in the drawings. Scarify and compact top 8 inches of subgrade to ninety percent (90%) of standard density (AASHTO T-99) at optimum moisture. All fills will be placed in maximum six-inch (6") layers and will be smooth and well compacted and to form a uniform plane. The contractor will alert the owner of any "soft spots" or structures that could affect the stability of the slab.

C. Sand Base: The base material shall be placed with automatic laser-regulated equipment capable of providing a true plane to plus or minus one-quarter inch (+1/4"). The depth of the fine grade base material shall be sufficient to develop one-quarter inch (1/4") accuracy. Place in one layer and compact to ninety five percent (95%) of standard density (AASHTO T-99) at optimum moisture content. Consultant shall perform density testing on the granular base to verify that the compaction meets the project specifications.

D. Fine Grade Base: Place with automatic laser-regulated equipment capable of providing a true plane to plus or minus one-quarter inch (+1/4"). Place in one layer and compact to ninety five percent (95%) of standard density (AASHTO T-99) at optimum moisture. Grade fine grade base material to within one-quarter inch (1/4") accuracy.

E. Refer to Site Preparation 31 20 00 for further information on sub-base and base prep.

F. Place vapor barrier.

G. Coordinate with Isolation Joints at perimeter of slab where necessary.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Forms shall be accurately set to the lines and to plus or minus one-quarter inch (±1/8") of finished grades indicated on drawings and be securely staked to prevent settlement or movement during placement of concrete.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 TENSIONING TENDONS AND ANCHORS

A. All tendons shall be supported on plastic chairs and loosely tied two inches (2") high at all intersections (too tightly tied, tendon friction will increase when tensioning) to prevent vertical and horizontal movement during concrete placement. Tendons shall be placed as Consultanted. See drawing details for tendon spacing.

B. Install tendons and anchors at locations shown on plans. Locate Interior tendons (away from edge of slab or opening) at the approximate location dimensioned on plans. Tendon locations not dimensioned on plans shall be placed at approximately equal spaces between dimensioned control points.

C. All tendon overlaps shall be centered in depth in concrete slab unless noted otherwise.

D. Secure all tendons at each intersection with the appropriate plastic chair or Dobie blocks. Vertical tendon dimensions shall vary not more than 1/8" from the dimensions shown on the drawings. Plastic chairs which provide saddle or side clips for the tendons need only be tied at every third tendon intersection. Dobie block or other chairs which allow tendons to move laterally shall be tied at each tendon intersection. Tie all tendon intersections at the perimeter of the slab.

E. Remove plastic tendon sheathing within 3 inches of back of anchor. Secure the dead end and stressing end anchors to the form boards with nails. Provide proper concrete coverage per project details.

F. Within the thickened perimeter, tendons are anchored approximately 3.5” down from the surface of the slab—see details. Two #4 rebar shall be placed longitudinally around the court beam directly inside the tendon anchor, one under and one over the tendon(s); refer to drawing details. Overlapping should be a minimum of three (3) inches.

3.5 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963/D3963M.

F. Placement of steel reinforcement shall be coordinated with placement of post-tensioning tendons; proper tendon placement has priority.

3.6 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Isolation Joints: Form isolation joints of pre-formed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.

2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

C. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.7 CONCRETE PLACEMENT

A. A full court shall be placed in one continuous operation without intervening joints of any kind. The slab will be placed with a fourteen- and one-half foot (14.5') mechanical laser screed capable of providing a surface to + 1/8" in 10' at a 0.83% slope.

B. Concrete contractor shall ensure that workmen exerciser great care so as not to disturb locations of tendons during concrete placement.

C. Before placing concrete, inspect and complete formwork installation, post-tensioning tendons and anchors, steel reinforcement, and items to be embedded or cast-in.

D. Remove snow, ice, or frost from subbase surface, post tensioning tendons and anchors, and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

E. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

F. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

G. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

H. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, post-tensioning tendons and anchors, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating post-tensioning reinforcement, dowels, and joint devices.

I. Screed paving surface with a straightedge and strike off.

J. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.8 TENSIONING TENDONS AND ANCHORS

A. After the forms are removed and the concrete has set to a minimum of 1,700 PSI, the “half stress” tensioning procedure may begin. Approximately one (1) week later, each tendon may be tensioned to a maximum of eighty percent (80%) ultimate breaking strength, and anchored a minimum of seventy percent (70%) ultimate breaking strength.
   a. 100% Ultimate breaking strength = 41.3 Kips
   b. 80% Ultimate breaking strength = 33.0 Kips
   c. 70% Ultimate breaking strength = 28.9 Kips

B. The tendon ends shall be cut off and cone holes grouted flush with edge of slab. Grout shall be non-shrink grout.

3.9 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to backboards (from sideline to sideline), to provide a uniform, fine-line texture.

3.10 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing as follows:

   1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, with sides and ends lapped at least 12 inches , and sealed by waterproof tape or

adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

3.11 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 (ACI 117M) and as follows:

1. Elevation: 3/4 inch
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch .
4. Joint Spacing: 3 inches.
5. Joint Width: Plus 1/8 inch, no minus.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M will be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results to be reported in writing to Consultant, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests to contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting

agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Consultant but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Consultant.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.13 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Consultant.

B. Drill test cores, where directed by Consultant, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Painted markings applied to concrete surfaces.

1.2 RELATED DOCUMENTS

A. 32 13 13 - POST-TENSIONED CONCRETE SPORT COURT

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to marking concrete surfaces including, but not limited to, the following:

a. Concrete-surface aging period before application of pavement markings.
b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

A. Product Data: Include technical data and tested physical and performance properties.
1. Pavement-marking paint, latex.

B. Retain "Samples" Paragraph below for single-stage Samples, with a subordinate list if applicable.

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of MDOT (Michigan Department of Transportation) and ASBA (American Sports Builders Association) for pavement-marking work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain pavement-marking paints from single source from single manufacturer.

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint, Latex: MPI #97, latex traffic-marking paint.

1. Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete surfaces to age for a minimum of 60 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to asphalt paving or concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during the remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

SECTION 32 92 00
FINE GRADING, LAWN SEEDING and SITE STABILIZATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide all fine grading and seeding where shown on Drawings, as specified herein and as necessary for a complete and proper installation.

B. Work shall include but not be limited to:

1. Placing topsoil for landscape beds, rain gardens, Microclover and lawn areas.
2. Fine grading for landscape beds, rain gardens, Microclover and lawn areas.
3. Installing Microclover Seed
4. Installing lawn mix with the addition of the following seeds:
    a. Dutch Micro Clover
    b. Violets

1.02 RELATED DOCUMENTS

A. Attention is directed to Bidding and Contracting Requirements, Drawings and General Provisions of the Contract, including General Conditions and the Wayne County Standard Specifications for Construction, which are hereby made part of this Section.

B. Related sections:

1. Site Preparation 31 10 00
2. Erosion and Sedimentation Controls 31 25 00
3. Earth Moving 31 20 00
4. Plants 32 93 00

1.03 REFERENCE SPECIFICATION

A. AOSA -Association of Official Seed Analysis: Rules for testing Seeds, Journal of Seed Technology, 1991 Edition

B. TAPPI-Technical Association of the Pulp and Paper Industry

C. AOAC - Official Methods of Analysis, Association of Official Analytical Chemists.

D. Materials and work covered under this Section shall be in accordance with MDOT (2020 edition), Wayne County, Standard Specifications for Construction unless otherwise indicated. If a conflict exists between specifications, the more rigorous shall govern.

1.04 QUALITY ASSURANCES

A. Soil amendments: Copies of invoices shall be provided to the CONSULTANT. Samples must be provided if requested by the CONSULTANT.

B. Seed: Provide the CONSULTANT with manufacturer's certification of compliance to the Specifications prior to seeding.

C. The CONTRACTOR shall notify the CONSULTANT of seed sources 30 days after the contract award.

D. CONTRACTOR shall review seed sources with CONSULTANT prior to ordering and shall submit an invoice following purchase and delivery of the seed.

E. Installation of seed shall be carried out by CONTRACTOR and their employees who are thoroughly experienced and skilled in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section. The CONTRACTOR shall have a minimum of five (5) years documented experience in comparable work.

F. Grading and seeding layout shall be reviewed by the CONSULTANT prior to completion.

1.05 SUBMITTALS

A. The CONTRACTOR shall submit to the CONSULTANT sources for seed 30 days after contract award.

B. The CONTRACTOR shall submit to the CONSULTANT a plan and schedule for seeding at least two (2) weeks prior to the scheduled commencement of work.

C. The CONTRACTOR shall submit to the CONSULTANT results of the soils analysis and starter fertilizer recommendation dictated in TOPSOIL section of this Specification.

1.06 DELIVERY, STORAGE AND HANDLING

A. Soil amendments shall be kept dry.

B. Seed shall be delivered in original sealed containers, labeled in accordance with State Regulations and the US Department of Agriculture Rules and Regulations under the Federal Seed Act. Seed shall be stored in such a manner that it will be protected from damage by heat, moisture, rodents, or other causes.

1.07 SEEDING TIME

A. Permanent lawn and Microclover seeding shall be done between May 1 and June 15, or between August 15 and September 15 or as otherwise approved by the CONSULTANT.

B. Erosion control matrix can be seeded in the fall prior to the spring planting or within the same planting season, as conditions necessitate for erosion control and establishment of the permanent seed matrices.

PART 2 - PRODUCTS

2.01 STARTER FERTILIZER

A. Starter fertilizer for lawn seed, sod, and Microclover seed: Starter fertilizer shall be Milorganite (6-2-0), available through Rhino Seed and Landscape Supply, Brighton, Michigan (800.482.3130), or approved substitute.

2.02 LAWN SEED

A. Apply lawn seed at a species rate of 250lb/acre.

B. The Proposed lawn is to be seeded with a lawn mix (below), then overseeded with a mix (below).

C. Lawn seed shall be THV Mix (Heavy Soil). Seed Supplier: Seed is available through Rhino Seed 850 N Old US 23 Brighton, MI 48114 (800.482.3130).

D. Lawn overseed shall be Bee Lawn Seed Mixture (Flowers Only). Seed Supplier: Seed is available through Twin City Seed Co., 7265 Washington Ave S, Edina, MN (800.545.TURF).

E. Apply overseed at a rate of 2.5lb/1,000sqft (Two and a half pounds per thousand square feet).

2.03 MICROCLOVER SEED

F. Apply Microclover seed at a species rate of 1lb/1000sqft (1 pound per 1,000 square feet).

A. Microclover areas on the plans are to be seeded with a Microclover seed mix (below).

B. Microclover seed shall be the Microclover blend from BioAg. Seed Supplier: Seed is available through Rocky Mountain BioAg 3045 Aerotech Parkway, Unit 6, Montrose, CO 81401 (877.874.2334).

2.04 EROSION CONTROL/SEED MATRIX

A. Apply erosion control seed matrix at a species rate of pounds per acre as indicated on the Drawings.

B. Seed sources for the erosion control seed matrix are available through Rhino Seed and Landscape Supply, Brighton, Michigan (800.482.3130).

2.05 MULCH for LAWN AND MICROCLOVER SEED-DRY

A. Material shall be straw. It shall be natural and suited for horticultural use and not contain lumps, roots or other foreign matter over one inch in diameter. It shall be free of noxious weeds. Mulch shall not contain more than 35-percent moisture by weight.

2.06 MULCH for LAWN AND MICROCLOVER -HYDROSEED

A. Material shall be RhinoTurf or AmTurf Green Star Plus, paper mulch with binder or approved substitution.

2.07 HYDOSEED TURF SLURRY MIX

A. Mix shall consist of:

1. Fertilizer: 1300 lbs per acre
2. Mulch: 2000 lbs per acre
3. Lawn Seed: 5.7 lbs per 1,000 square feet or 250 lbs. per acre
4. Microclover Seed: 1 lbs per 1,000 square feet or 44 lbs. per acre

2.08 WATER

A. Source: If not available on site, shall be provided by the CONTRACTOR. CONTRACTOR may rent a hydrant meter from Oakland County's field operations unit, and must install backflow preventer on the meter assembly. Rent is $1000 with the fee being applied to water use counted by the hydrant meter. Any unused portion of the rental fee returned to the CONTRACTOR at the time the CONTRACTOR returns the meter assembly to the OWNER. If the CONTRACTOR exceeds the rental amount at time of return, the CONTRACTOR shall pay Customer Service the difference.

B. Quality: Water supplied by the CONTRACTOR shall be free of substances harmful to plant growth.

2.08 TOPSOIL

A. Follow requirements outlined in the – SITE PREPARATION 31 10 00 Section, or see Civil Engineer's plans for information on existing topsoil.

B. Existing topsoil that has been stripped and stockpiled shall be re-spread on the finished sub grade. It shall be free of any admixture of subsoil, stones larger than one (1) inch, clods of hard earth, plants or roots, sticks, concrete, asphalt, or other extraneous material. It shall contain no toxic materials.

C. Quantity: The CONTRACTOR shall be responsible for estimating the quantity of topsoil stockpiled, and the quantity of imported topsoil necessary to obtain the specified depth of topsoil to be re-spread. The CONTRACTOR shall report any discrepancy between work on the Plans and in the Specifications to the CONSULTANT.

D. Depth of topsoil for various planting conditions are as follows:

a. Lawn and Microclover areas: 4"
b. Rain Gardens: 12"
c. Planting bed areas: 6"

E. Imported topsoil shall be friable sandy loam capable of supporting optimal plant growth and development. It shall be free of clay lumps, subsoil, invasive weeds and seeds, stones, sticks and other extraneous materials.

F. Analysis for existing and any necessary imported topsoil for planting areas shall be done at the CONTRACTOR'S expense and shall be submitted to OWNER/CONSULTANT for approval prior to use.

a. The structural topsoil analysis for PLANTING AREAS shall include the following and be within the listed parameters:
b. 1. Clay content: 5-15%
c. 2. pH range: 6.0-7.5
d. 3. Organic matter content: 5-10%
e. Testing for topsoil for Planting areas may be performed through A&L Great Lakes Laboratories, Inc., Fort Wayne Indiana 260.483.4759.

2.09 COMPOST

A. Compost shall be used only from a facility registered within the State of Michigan that provides regular testing, or as approved by CONSULTANT.

2.10 EROSION CONTROL BLANKET

A. Erosion control blanket shall be North American Green Straw Erosion Control Blanket S150 BN, 100% biodegradable, jute netted or approved substitution.
B. Pegs shall be of sound wood and sized per MDOT Standard Specifications, latest edition.
C. Erosion control blanket supplier: Erosion control blanket is available through Price and Company, Inc., Wyoming, Michigan (616.530.8230).

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. In landscape bed areas: Upon completion of rough grading, the CONTRACTOR shall de-compact and scarify the subgrade, to a minimum depth of two (2) inches.
B. Subgrade depth in rain gardens: 12”
C. Subgrade depth in lawn and Microclover areas: 4”
D. Subgrade depth in planting beds: 6”

3.02 PLACING TOPSOIL and FINE GRADING

A. Repair topsoil as directed by the CONSULTANT so that finish grades are met.
B. Topsoil shall be placed to a minimum depth of four (4) inches for lawn/Microclover areas, six (6) inches depth for planting areas and twelve (12) inch depth for rain gardens, so that the finish surface is a fine seedbed, varying not more than one (1) inch in ten (10) feet.
C. Final grades will be reviewed by the CONSULTANT prior to demobilization/completion.

3.03 HYDROSEEDING FOR LAWN

A. Mixing:
1. Mix location: Perform slurry preparation at job site.
2. Adding water: Add water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, establish good re-circulation and add seed.
3. Seed: Do not allow seed to remain fore than 30 minutes is slurry.
4. Fertilizer: Add fertilizer without mulch. Commence spraying immediately when the tank is full.
5. Mulch: Apply mulch in a separate operation after seed and fertilizer have been applied.

B. Application:
1. Apply specified slurry mix in a sweeping motion to form a uniform mat at the specified rate
2. Keep hydroseeding within designated areas and keep from contact with other plant materials
3. Apply seed and mulch in two separate operations.

3.04 SEEDING AND FERTILIZING FOR LAWN AND MICROCLOVER

A. Application:
1. Sow the seed using a mechanical seeder such as a lawn maker or brillion. A cultipacker or approved similar equipment may be used to cover the seed and form the seedbed in one operation.
2. Sow at the species rate of pounds per acre as indicated on the drawings.
3. Lines of seed shall be perpendicular to slopes to reduce rapid surface water run-off. If this option is chosen fertilize prior to seeding operations.

B. Fertilizing:

1. The City of Ann Arbor has adopted an ordinance limiting phosphorus in fertilizer. Applications of fertilizer beyond the initial topsoil and seeding shall be a fertilizer with no phosphorus.
2. Apply starter fertilizer with a mechanical spreader prior to seeding operation as necessary to promote optimal growth.
3. Thoroughly incorporate fertilizer into topsoil to a depth of two (2) inches.
4. Immediately before sowing lawn/Microclover seed, CONTRACTOR shall rework the surface until it is fine, pulverized seed bed, varying not more than one (1) inch in ten (10) feet.

3.05 WEEDS

A. Invasive grasses such as crabgrass, smooth brome, reed canary, quack grass or other invasive grasses and/or forbs shall be spot controlled beginning in May with Herbicide-A (or approved substitution) until the end of the first full growing season and/or before the plants set seed. Herbiciding maintenance shall not threaten any adjacent planting areas. Alert the CONSULTANT if a conflict between lawn/Microclover maintenance and the health of the planting areas exists.

3.06 EROSION CONTROL BLANKET INSTALLATION

A. Install erosion control blanket per manufacturer's specifications in locations indicated on Plans. In addition, erosion control blanket shall be installed where the CONTRACTOR feels it necessary to stabilize the site. Additional blanket beyond what is indicated on the Plans shall be provided and installed at the expense of the CONTRACTOR.

B. Begin at top of the slope by anchoring the blanket in a 6-inches deep x 6-inches wide trench. Backfill and compact the trench after staking.

C. Roll the blankets down the slope in the direction of the water flow.

D. The edges of parallel blankets must be staked with approximately two (2)-inch overlap. When blankets must be spliced down the slope, place blankets end over end (shingle style) with approximately six (6)-inch overlap. Stake through overlapped area, approximately 12 inches apart.

E. In general, stake blanket approximately one (1) stake per one (1) square foot.

3.07 MULCHING

A. Lawn/Microclover seeded areas shall be mulched per MDOT Specifications, latest edition.

3.08 ESTABLISHMENT AND ACCEPTANCE: LAWN and MICROCLOVER

A. The OWNER will water and maintain lawn for this project. OR CONTRACTOR may use building water to maintain lawn/Microclover for this project.

END OF SECTION

SECTION 32 93 00
PLANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide Planting where shown on drawings as specified herein, and as needed for a complete and proper installation.

B. Work shall include:
1. Tree and shrub planting
2. Perennial, and groundcover planting
3. Landscape bed steel edging

1.02 RELATED DOCUMENTS

A. Attention is directed to Bidding and Contracting requirements, drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections, which are hereby made part of this section.

B. Related Sections:
1. Fine Grading, Lawn Seeding and Site Stabilization 32 92 00
2. Plant Maintenance and Guarantee Period 32 93 20

1.03 REFERENCE SPECIFICATIONS

A. AOSA -Association of Official Seed Analysis:

B. Rules for testing Seeds, Journal of Seed Technology, 1991 Edition

C. TAPPI-Technical Association of the Pulp and Paper Industry

D. AOAC - Official Methods of Analysis, Association of Official Analytical Chemists.

E. Materials and Work covered under this Section shall be in accordance with MDOT (2012 edition), Washtenaw County, and City of Ann Arbor standards and specifications unless otherwise indicated. If a conflict exists between specifications, the more rigorous shall govern.

1.04 QUALITY ASSURANCE

A. CONTRACTOR shall provide CONSULTANT with a list specifying sources of plant material.

B. Inspection: The CONSULTANT may inspect plants at place of growth or on site prior to planting. Rejected material shall be immediately removed from site. Material damaged during planting may be rejected after planting. Material approved at place of growth, but damaged during transportation may also be rejected.

C Installation of plants shall be carried out by Contractors and their employees who are thoroughly experienced and skilled in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section. The CONTRACTOR shall have a minimum of five (5) years documented experience in comparable work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Plant material delivery shall be the same day as planting. No plants shall be stored at the site without permission of the CONSULTANT. Plants shall be carefully loaded and unloaded so as not to damage branching or root mass. Dropping of material will not be allowed. Plants in full leaf shall be thoroughly wetted down and completely covered with a wet tarp during transportation.

B. All plant roots must be kept in a moist condition.

C. Digging and Handling Plant Material: Digging shall be during the dormant season, preferably between 1 October and 1 May. Plant material which is poorly packed, or which arrives with the roots in a dry condition, as a result of improper packing, delay in transit, or from any other cause, will not be accepted. Stock shall be handled in such a manner that the roots shall remain intact, the branches unbroken, and the bark intact

and not loosened from the wood. Stock shall be protected from drying and from temperatures below 50°F and in excess of 90°F prior to planting.

1.06 SUBMITTALS

A. The CONTRACTOR shall submit to the CONSULTANT sources for all plant material 30 (thirty) days after contract award

PART 2 - PRODUCTS

2.01 PLANTS

A. Material shall be of the size, genus, species, variety and any other special designation as shown and scheduled for on the drawings, on the attached Proposal Form or in these Specifications. No substitution of species, variety or size shall be accepted without written approval from the CONSULTANT and OWNER. Plant material shall be nursery grown, under climatic conditions similar to those in the locality of the project.

B. Quality: Plants shall comply with the recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock." Plants shall be healthy, vigorous stock, grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sunscald, injuries, abrasions, or disfigurement.

1. Plants balled with plastic burlap will not be accepted.

C. Labeling: All plants shall be labeled with securely-attached waterproof tab bearing legible designation of botanical and common name.

D. Formal arrangements if/where shown on planting plan shall have trees selected for uniform height and spread.

2.02 TOPSOIL

A. Topsoil shall be as described in - FINE GRADING, LAWN SEEDING and SITE STABILIZATION Section (32 92 00) - of these specifications.

2.03 FERTILIZER

A. Fertilizer shall be slow release, at minimum 50% derived from a natural, organic source, 12-0-6 or approved substitution.

2.04 COMPOST

A. Compost shall be used from one of the following options:

a. Ann Arbor Compost Center: 4170 Platt Rd, Ann Arbor, Mi 48108. (410)-849-6117.

b. City of Ann Arbor, available from City of Ann Arbor Materials Recovery Facility 1(734) 971-8600.

c. Alternative source approved of by CONSULTANT.

2.05 TOPSOIL MIX

B. A. See Topsoil as defined in Fine Grading, Lawn Seeding and Site Stabilization 32 92 00

2.06 PRE-PLANTING SUPPORT

A. Material for support through transplanting shock shall be Bio-Plex Technical Transplant Concentrate and Plant Enhancer or approved substitution. This product is available through Bio-plex, Inc., 1.800.441.3573

2.07 WATER

A. Source: If not available on site, water shall be provided by the CONTRACTOR

B. Quality: Water supplied by the CONTRACTOR shall be free of substances harmful to plant growth.

2.08 MULCH

A. Material around isolated trees and in planting bed areas shall be shredded hardwood bark free of weeds, soil, sticks or trash, and shall have a uniform appearance. A sample shall be approved by CONSULTANT prior to application.
1. Colored or dyed mulch will not be accepted.

2.09 LOCATION STAKES

A. Stakes for plant locations shall be 1" X 2" X 3', and supplied by the CONTRACTOR.

2.10 TREE SUPPORT

A. Stakes for tree support shall be 2" x 2" hardwood stakes or approved equal driven 6-8" outside of the rootball.

B. Support shall be 2"-3" wide belt-like nylon or plastic straps DO NOT USE rope or wire encased in a hose.

C. Tree support should include any transplanted trees.

2.11 STEEL LANDSCAPING EDGING

A. Steel Landscaping Edging shall be painted DURAEDGE, 3/16" thick x 4" depth with interlocking joints, corner joints and steel stakes, as manufactured and supplied by The J.D. Russsell Company, 1.800.888.9708, or approved substitution.

B. Color shall be determined by CONSULTANT prior to ordering.

PART 3 - EXECUTION

3.01 PLANTING SUPPORT

A. If trees and/or shrubs are planted from May through August, or when there are drought conditions during September through April, the CONTRACTOR shall provide planting support to each balled and burlapped specimen with Bio-Plex Technical Transplant Concentrate and Plant Enhancer (per manufacturer's instructions on label) by means of:
1. A foliar application (through spray) upon receipt of trees and shrubs
2. A root application (through tree gators) upon planting of trees and shrubs

3.02 LAYOUT

A. Locations of trees, shrubs, perennials and groundcover shall be established by the CONTRACTOR according to plans.

B. Locations for trees and shrubs shall be identified with stakes. Different species shall be clearly labeled and marked with different color ribbon, paint or permanent marker on the stake.

C. The location of the grant funded replacement tree shall be staked by the CONSULTANT, the location of which does not appear on plans.

D. Perennials, ornamental grasses shall be laid out in their containers on top of the ground.

E. Groundcover zones shall be laid out by paint.

F. Review: The CONTRACTOR shall notify the CONSULTANT when staking and layout is completed and allow two working days for modifications and notice to proceed with planting.

3.03 TREE and SHRUB PLANTING

A. Balled and/or container stock as per detail:
1. Set plants plumb.
2. **B&B STOCK:**
   a. Remove all bindings and burlap from top one half of ball and remove from site.
   b. Cut wires of basket and fold completely down into hole.

   CONTAINER STOCK:
   a. Remove all containers and packaging material before planting and remove from site.
3. Backfill with topsoil mix. Water and foot compact at intervals. Do not damage root structure.

4. Mulch to a depth as shown on the details and soak the mulch with water. Thoroughly soak root ball with water.
5. Prune all dead wood at first live lateral bud in accordance with standard horticultural practices using sharp instruments cleaned frequently. If necessary, any additional pruning will be directed by the CONSULTANT. Do not prune terminal leader or branch tips. A plant's natural form shall not be compromised by any pruning activities. Promptly remove all pruned material from site.
6. STAKE all trees as follows:
   a. Stakes shall be driven 6"-8" outside of the rootball.
   b. Loosely stake tree to allow for trunk flexing.
   c. Attach support straps around tree trunk just below first branch of tree (2 per tree on opposite sides of the tree).
   d. Remove all tree support after one year.
7. Remove all nursery applied tree wrap, tape or string from trunk and crown. Remove any tags or labels and remove from site.

3.04 PERENNIAL, and GROUNDCOVER PLANTING

A. Container stock as per detail:
1. Remove all containers and packaging material before planting and remove from site.
2. Set plants plumb.
3. Backfill with topsoil mix. Do not damage root structure.
4. Mulch to a depth as shown on the details and soak the mulch with water. Thoroughly soak root matter with water.

END OF SECTION

SECTION 32 93 20
PLANT MAINTENANCE and GUARANTEE PERIOD

PART 1 - GENERAL

1.01 SUMMARY

A. The CONTRACTOR shall furnish all labor, materials, equipment, transportation, services and necessary appurtenant work as required to complete the work as shown on the Plans and/or as specified herein.

B. Extent of work shall include but not be limited to:

1. Disease and insect control
2. Pruning
3. Fertilizer Application
4. Mulching
5. Removal of plant support and tags (if any)
6. Watering
7. Guarantee of Plant Material for one year

1.02 RELATED DOCUMENTS

A. Attention is directed to Bidding and Contracting requirements, drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections, which are hereby made part of this section.

B. Related Sections:

1. Fine Grading, Lawn Seeding and Site Stabilization 32 92 00
2. Plants 32 93 00

1.03 REFERENCE SPECIFICATION

A. Materials and Work covered under this Section shall be in accordance with MDOT (2012 edition), Washtenaw County, and City of Ann Arbor standards and specifications unless otherwise indicated. If a conflict exists between specifications, the more rigorous shall govern.

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.05 DEFINITIONS

A. Definition of Period for lawn, Microclover, and plant material: The Plant Maintenance and Guarantee Period begins the spring following planting and continues until the end of that growing season. A growing season is defined as the beginning of April through mid-November. If planting is not completed prior to the end of May, the First Maintenance and Guarantee Period includes the remainder of that growing season plus the next growing season.

B. Definition of Period for Planting Areas: The Maintenance and Guarantee Period begins the spring following planting and continues until the end of that growing season. A growing season is defined as the beginning of May through mid-November. If planting is not completed prior to the end of May, the First Maintenance and Guarantee Period includes the remainder of that growing season plus the next growing season.

1.06 SCHEDULE

A. Schedule: A minimum of one visit is required for each of the following time periods during the Guarantee period. During each visit, CONTRACTOR shall complete all necessary tasks to comply with the requirements outlined in these specifications.

1. 1 April to 15 April
2. 1 May to 15 May
3. 1 June to 15 June

4. 1 July to 15 July
5. 1 August to 15 August
6. 1 September to 15 September
7. 1 November to 15 November

B. Verification of visits, in the form or reports and certified payroll covering visits, shall be provided to the OWNER.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packaged materials shall be delivered in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and storage.

PART 2 - PRODUCTS

2.01 PESTICIDES & HERBICIDES

A. Materials shall comply with Local, State and Federal regulations.

B. Common IPM (Integrative Pest Management) practices shall be followed. Pesticides and herbicides shall be used as a last resort.

2.02 FERTILIZER

A. Materials shall conform to the standards of the Association of Agricultural Chemists and shall comply with State and Federal regulations.

B. Fertilizer for woody plants shall be an organic, slow release with a ratio of 3-1-2 or 3-1-1 or approved substitution.

C. Maintenance fertilizer for lawn and Microclover shall contain no phosphorus, shall be derived from an organic product, and slow release with a ratio of 27-0-12 or approved substitution. Fertilizer available from Downtown Home and Garden, 734-662-8122.

D. There shall be no fertilizer applied to planting areas.

2.03 WATER

A. Source: If not available on site, shall be provided by the CONTRACTOR.

B. Quality: Water supplied by the CONTRACTOR shall be free of substances harmful to plant growth.

2.04 MULCH

A. Material shall be shredded hardwood bark free of weeds, soil, sticks or trash, of a uniform appearance.

1. Colored or dyed mulch will not be accepted.

PART 3 - EXECUTION

3.01 DISEASE and INSECT CONTROL

A. Monitoring for diseases and insects shall be the responsibility of the CONTRACTOR. The CONTRACTOR shall monitor all plants at all times for disease and insect problems.

B. Treatment shall take place in accordance with common IPM practices.

C. Pesticides shall only be used when and where necessary as approved by the OWNER. Manufacturer's directions and precautions must be followed literally. Applicators shall be licensed by the State of Michigan. Applicators shall be knowledgeable in the application of pesticides and appropriate equipment used. Excess pesticides shall be properly removed from the site.

3.02 PRUNING

A. Prune all dead wood at first live lateral bud in accordance with standard horticulture practices using sharp instruments cleaned frequently. Pruning shall enhance plant development and ornamental qualities. Do not prune terminal leader or branch tips. A plant's natural form shall not be compromised by any pruning activities.

B. Additional pruning may be required at the request of the OWNER in order to decrease public liability factors.

C. Remove immediately after pruning all dead, broken and diseased growth and other pruning debris from the site and dispose of in an environmentally sensitive manner.
D. Plant material that is "topped" by the CONTRACTOR shall be replaced at the CONTRACTOR's expense.

3.03 MAINTENANCE FERTILIZER APPLICATION

A. Application shall be according to manufacturer's directions.
B. Woody Plants
1. Maintenance Fertilizer application for woody plants shall occur in November of the Second Maintenance and Guarantee Period
2. Topdress at a rate of 1 pound of nitrogen per 1,000 square feet.

C. Lawn and Microclover
3. Maintenance Fertilizer application for lawn and Microclover shall occur in May and October of the First and Second Maintenance and Guarantee Periods. For Spring seeding, commencement of maintenance fertilizer shall begin the subsequent fall. For Fall seeding, commencement of maintenance fertilizer shall begin the subsequent spring.
4. For May fertilizing, topdress at a rate of half (.5) a pound of nitrogen per 1,000 square feet.
5. For October fertilizing, topdress at a rate of one and a half (1.5) pounds of nitrogen per 1,000 square feet.

3.04 ORNAMENTAL GRASS MAINTENANCE

A. Timing: April maintenance visit.
B. Cut all dead grass from previous season's growth to a height of eight (8) inches to promote new season's growth and allow for overwintering solitary bee survival.
C. Remove dead grass immediately after cutting all dead growth and other pruning debris from the site and dispose of in an environmentally sensitive manner.

3.05 WEEDING

A. Frequency shall be every visit.
B. Methods: Weeds shall be removed by hand. Before application of any herbicide the CONTRACTOR shall receive approval of the OWNER. A selective herbicide shall be applied according to manufacturer's directions.

3.06 MULCHING

A. Monitoring: All mulch beds shall be reviewed in June and September for each Maintenance and Guarantee Period. Any beds that do not meet the following conditions shall be replenished.
1. Depth shall be two (2) inches typical shredded hardwood bark for individual trees and shrub planting areas.
2. Depth shall be two (2) inches typical shredded hardwood bark for perennial, ornamental grass and wall stabilization planting areas.
3. Do not allow mulch to be deeper than four (4) inches.
4. Keep mulch four (4) inches away from root collar of trees.

3.07 REMOVAL of TREE SUPPORT and TAGS

A. Repair all damaged guys and stakes during First Maintenance and Guarantee Period
B. Remove all stakes, guys, labels and support material at the end of the First Maintenance and Guarantee Period and remove from site.

3.08 WATERING

A. Monitor all plants during site visits for water stress.
B. Water as required to keep all plants in optimum health—this may exceed the time windows outlined in the schedule. For all plantings, apply water in a slow trickle to allow water to penetrate down into root zone of plant.

C. Native plugs in the deepest ponding area may require more watering than other planting areas.

D. Adjust frequency and length of time for watering cycles according to changing soil and weather conditions. The CONTRACTOR is responsible for watering as necessary for plant survival at no additional cost to the OWNER.

3.09 WEED CONTROL: ALL PLANTING and SEEDING AREAS

A. Weeding of all planting areas shall occur prior to invasive weed species (Sweet Clover, Burdock, Wild Carrot, Purple Knapweed, Purple Loosestrife, Canada Thistle, Phragmites, etc.) setting their seed or as determined by CONSULTANT.

B. Post planting management procedures for rain garden planting area may consist of, but are not limited to the following:

1. Pull invasive weed species to remove root.
2. Spring or fall dormant seasons application of a non-selective herbicide to control invasive weeds. As directed by the OWNER. Follow Washtenaw County signage requirements following herbicide application.
3. Summer application of a selective herbicide to control invasive weeds. As directed by the OWNER. Follow Washtenaw County signage requirements following herbicide application.
4. A late winter/early spring burn to encourage native plants, control invasive weeds and prevent excessive build-up of thatch. This may take place outside of outlined maintenance visit times if optimum burning conditions exist. Any burn plans must be coordinated with the OWNER.

C. Acceptance will be when all the above requirements have been met.

3.10 SPRING CLEAN-UP

A. During the first spring maintenance visit at least 6 months after planting, the CONTRACTOR is responsible to cut all standing dead vegetation and remove it from the site.

3.11 GUARANTEE of MATERIAL

A. Responsibilities: The CONTRACTOR shall replace, at no cost to the OWNER, all dead vegetation during the Guarantee Period.

B. Judgment of the plant's health will be the CONSULTANT'S or the OWNER'S.

C. Planting methods shall be the same as specified herein and in the planting details unless directed by the CONSULTANT.

D. Limits: Plants replaced during the Maintenance and Guarantee Periods are only under guarantee during those periods.

END OF SECTION

City of Ann Arbor
Mandatory Pre-Proposal Meeting

RFP# 24-57 – New Fire Station 4
November 7, 2024 at 11:00 AM

	First /Last Name	Department/Entity	Phone #	E-Mail Address
1.	DON BARRY	A3C	734-663-1910	DBARRY @ A3C.com
2.	Wayne King	Corrigan	419-450-2942	WKING@corriganoil.com
3.	SHAWN DREECH	BOONE + DARR	7343202463	Shawnd@boone-darr.com
4.	JASON HAMMOND	AZSHMINA	810-227-5100	JASONS@AZSHMINA.com / MZ@AZSHMINA.com
5.	Michael Haeussler	E.T. Mackenzie Co.	734-260-1732	mhaeussler@mackenzieco.com
6.	Kelly Miller	A.R. Brouwer	734-426-9980	Kellymiller@arbrouwer.com
7.	Holly Hickman	TICHENOR INC.	269-986-8467	holly@Tichenorinc.com
8.	MARK DAVENPORT	DAVENPORT BROTHERS CO	734-697-2994	markadavenportbrothers.com Prime
9.	MICHAEL HEANEY	HEANEY GENERAL CONTRACTING	734-434-9330	MICHAEL@HEANEYGENERALCONTRACTING.COM
10.	Jim Nugent	WILTSE ELECTRIC	734-878-5947	westjason@yahoo.com
11.	JOE VELLA	COLAIANTI CONST. SVC	(586) 915-2466	JVELLA@COLAIANTIGROUP.COM
12.	Bob Rizk	NRC Builders	248-670-7327	bobe nrcbuilder.com
13.	Austin Gothard	Quality Roofing	7345509599	OFFICE@qualityroofing.com
14.	ANDREW HADEWINSKI	The Albert M. Higley AM Higley	248-234-2772	andrew.Hadewinski@amhigley.com
15.	Joey Hiser	Phoenix contractors Inc.	734-487-9640	jhiser@phoenixco.biz
16.	RICK STRANK	BRIVAR CONSTRUCTION	810-360-7826	RICK@BRIVAR.COM
17	Keith Norush	Summit Company	7349047191	knorush@summitcompany.net
18	JASON FOWLER	LOCKWOOD CONST.	248.540.7438	jfowler@lockwoodcompanies.com

Dan McGrath	SandhillGlass	586-777-6760	Dan.McGrath@SandhillGlass.com
Brad Kecskemeti	PCI - Dailey	248-721-0616	brad k@pcionesource.com
John Wilson	Granger	734-265-7971	jwilson@grangerconstruction.com
Chuck Ramsey III	Roofers Union Lo 70	517-518-4397	chuck@roofers local 70.com
Niko Schmieder	Monroe Plumbing	734-731-4578	Niko s@monroeplumbing.com
Cody Nickrand	Serve Electric	248-595-2498	Cnickrand@serveelectric.com
Garrett James	Keo + Associates	313-220-8421	gjames@keoassoc.com
Dan Randall	Hopp Electric	734-845-0463	dan@hopp-electric.com
Geoff Duke	Duke Roofing	734-434-2957	info@dukeroofingCompany.com
Randolph Stebner	Progressive Companies	503857-7041	rstebner@weareprogressive.com
Nasser Alremaih	DMC Group	248525 8008	nassera@dmcgroupusa.com
JEREMY Mihalic	Sorensen Gross	980-606-2781	Jmihalic@sgcompany.com
Deib Mougrabi	Axiom Construction Services Group	2487638948	dmougrabi@axiomcsgllc.com
Ben Freeman	Superior Electric Tri County	517.763.3280	BFreeman@SEGLLC.com
DeQuan Travis	PDSI Contractors GC	248-332-3011	dtravis@PDSIcontractors.com
Travis Deal	RM Technologies	(616) 307-8099	tdeal@rmtech.org
Calvin Freeman	Schindler Elevator	(517)242-5159	calvin.freeman1@schindler.com
Mohammad Snidi	DMC Group	3137590780	mohammads@dmcgroupusa.com
Steven Raab	Cardinal Roofing	989-482-9740	Sraab@cardinalRoofingpro.com

DRAWING INDEX KEY:

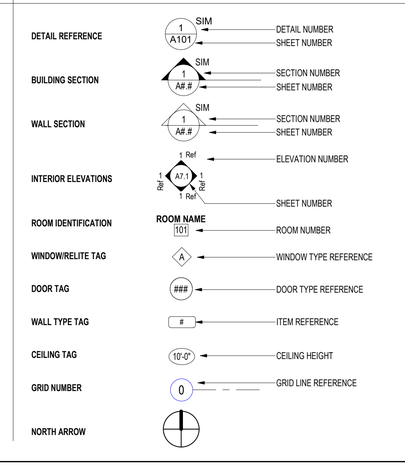
ISSUED FOR REFERENCE ONLY ○
ISSUED FOR REVIEW ◑
ISSUED FOR BID/PERMIT ●

SHEET #	SHEET NAME	Site Plan Approval 09/22/22	Design Development 05/26/23	Bids/Permits 08/04/23	Bids/Permits 10/11/24	Addendum #1 11/11/24
1. GENERAL						
G0.01	TITLE SHEET	◑	◑	●	●	
G0.02	SHEET INDEX	◑	◑	●	●	●
G0.03	SUMMARY SHEET		◑	●	●	
G0.04	WALL PARTITION TYPES			●	●	
G0.10	CODE COMPLIANCE		◑	●	●	
G0.11	CODE COMPLIANCE PLAN		◑	●	●	
2. CIVIL						
C-1.0	TOPOGRAPHIC SURVEY	◑		●	●	
C-1.1	TOPOGRAPHIC SURVEY	◑		●	●	
C-1.2	TOPOGRAPHIC SURVEY	◑		●	●	
C-1.3	ALTA/ASCM LAND TITLE SURVEY	◑		●	●	
C-1.4	ALTA/ASCM LAND TITLE SURVEY	◑		●	●	
C-1.5	SOIL BORING INFORMATION PLAN	◑		●	●	
C-2.0	DEMOLITION PLAN			●	●	
C-3.0	OVERALL DIMENSIONAL LAYOUT PLAN	◑		●	●	
C-3.1	TURNING MOVEMENTS & SIGHT TRIANGLES	◑		●	●	
C-4.0	GRADING PLAN	◑		●	●	
C-5.0	SOIL EROSION & SEDIMENTATION CONTROL PLAN	◑		●	●	
C-6.0	UTILITY PLAN	◑		●	●	
C-6.1	SANITARY SEWER AND WATER MAIN PLAN & PROFILE	◑		●	●	
C-6.2	STORM WATER PROFILES			●		
C-7.0	DRAINAGE PLAN	-		●	●	
C-7.1	STORM WATER PROFILES	◑		●	●	
C-7.2	STORM WATER DRAINAGE AREAS AND CALCULATIONS	◑		●	●	
C-7.3	WCWRC WORKSHEET-FIRE STATION SIDE	◑		●	●	
C-7.4	WCWRC WORKSEEETS - BASKETBALL COURT SIDE			●	●	
C-7.5	STORM WATER DETENTION OUTLET CALCULATIONS			●		
C-8.0	NOTES	-		●	●	
C-8.1	SESC NOTES & DETAILS	◑		●	●	
C-8.2	DETAILS	◑		●	●	●
C-8.3	ADS DETENTION SYSTEM DETAILS	◑		●	●	
3. LANDSCAPE						
L.01	NATURAL FEATURES PLAN	◑		●	●	
L.02	NATURAL FEATURES OVERLAY PLAN	◑		●	●	
L.03	NATURAL FEATURES TREE INFORMATION	◑		●	●	
L.04	OVERALL LANDSCAPE, TREE, SHRUB, AND SEEDING PLAN	◑		●	●	
L.05	LANDSCAPE PLAN FIRE STATION AREA	◑		●	●	
L.06	LANDSCAPE PLAN BASKETBALL AREA ALTERNATE #1	◑		●	●	
L.07	LANDSCAPE DETAILS			●	●	
L.08	BASKETBALL COURT DETAILS ALTERNATE #1					
4. ARCHITECTURE						
A2.11	FIRST LEVEL FLOOR PLAN	◑	◑	●	●	●
A2.12	SECOND LEVEL FLOOR PLAN	◑	◑	●	●	
A2.13	ROOF PLAN			◑	●	
A2.21	DOOR SCHEDULE, DOOR & FRAME TYPES		◑	●	●	●
A2.22	INTERIOR DOOR & WINDOW DETAILS			●	●	●
A2.41	INTERIOR FINISH SCHEDULE & KEY		◑	●	●	
A2.42	FINISH PLANS				●	
A3.11	EXTERIOR ELEVATIONS	-	◑	●	●	
A3.12	EXTERIOR ELEVATIONS	◑	◑	●	●	
A3.13	EXTERIOR ELEVATIONS	◑	◑	●	●	
A3.21	BUILDING SECTIONS		◑	●	●	
A3.22	BUILDING SECTIONS		◑	●	●	
A3.23	BUILDING SECTIONS		◑	●	●	
A3.31	WALL SECTIONS		◑	●	●	
A3.32	WALL SECTIONS		◑	●	●	
A3.33	WALL SECTIONS		◑	●	●	
A3.34	WALL SECTIONS		◑	●	●	
A3.35	WALL SECTIONS		◑	●	●	
A3.36	WALL SECTIONS		◑	●	●	
A3.37	WALL SECTIONS			●	●	
A3.41	EXTERIOR DETAILS			●	●	
A3.42	EXTERIOR DETAILS			●	●	●
A3.43	EXTERIOR DETAILS			●	●	●
A3.44	EXTERIOR DETAILS			●	●	●
A3.61	ROOF DETAILS			●	●	
A4.11	ENLARGED PLANS		◑	●	●	
A4.12	INTERIOR ELEVATIONS		◑	●	●	
A4.13	INTERIOR ELEVATIONS		◑	●	●	●
A4.14	INTERIOR ELEVATIONS		◑	●	●	
A4.15	INTERIOR ELEVATIONS		◑	●	●	
A4.16	INTERIOR ELEVATIONS		◑	●	●	
A4.17	INTERIOR ELEVATIONS		◑			
A4.18	INTERIOR ELEVATIONS		◑			
A5.11	ADA CODE SHEET		◑	●	●	
A6.11	FIRST LEVEL REFLECTED CEILING PLAN		◑	●	●	
A6.12	SECOND LEVEL REFLECTED CEILING PLAN		◑	●	●	
A6.21	CEILING DETAILS			●	●	●
A6.22	CEILING DETAILS			●	●	●
A7.11	ENLARGED STAIR & ELEVATOR PLANS		◑	●	●	
A7.12	STAIR & ELEVATOR SECTIONS		◑	●	●	
A7.13	STAIR & ELEVATOR DETAILS			●	●	●
A8.11	CASEWORK DETAILS			●	●	●
A8.12	INTERIOR FINISH DETAILS			●	●	●
5. STRUCTURAL						
S0.01	GENERAL STRUCTURAL NOTES		◑	●	●	
S0.02	LEGEND & ABBREVIATIONS		◑	●	●	
S1.01	FIRST LEVEL STRUCTURAL PLAN		◑	●	●	
S1.02	SECOND LEVEL STRUCTURAL PLAN		◑	●	●	
S1.03	ROOF STRUCTURAL PLAN		◑	●	●	●
S2.01	ELEVATIONS		◑	●	●	
S2.02	ELEVATIONS		◑	●	●	
S3.01	FOUNDATION SECTIONS		◑	●	●	
S4.01	SUPERSTRUCTURE SECTIONS		◑	●	●	
S4.02	SUPERSTRUCTURE SECTIONS			●	●	
S5.01	TYPICAL DETAILS		◑	●	●	
S5.02	TYPICAL DETAILS		◑	●	●	
S5.03	TYPICAL DETAILS		◑	●	●	
S5.04	TYPICAL DETAILS		◑	●	●	
S5.05	TYPICAL DETAILS		◑	●	●	
S5.06	TYPICAL DETAILS		◑	●	●	
S6.01	SCHEDULES		◑	●	●	
6. MECHANICAL						
M0.01	MECHANICAL STANDARDS AND DRAWING INDEX		◑	●	●	●
M0.02	MECHANICAL SITE PLAN		◑	●	●	
M0.03	ENERGY MODELING INFORMATION					
M3.01	FIRST LEVEL HVAC PIPING PLAN		◑	●	●	
M3.02	SECOND LEVEL HVAC PIPING PLAN		◑	●	●	
M4.01	FIRST LEVEL SHEET METAL PLAN		◑	●	●	●
M4.02	SECOND LEVEL SHEET METAL PLAN		◑	●	●	
M4.03	ROOF SHEET METAL PLAN		◑	●	●	
M5.01	ENLARGED MECHANICAL PLANS		◑	●	●	
M5.02	MECHANICAL SECTIONS		◑	●	●	
M5.03	MECHANICAL SECTIONS		◑	●	●	
M5.51	MECHANICAL ISOMETRIC VIEWS		◑	●	●	
M6.01	MECHANICAL DETAILS		◑	●	●	
M6.02	MECHANICAL DETAILS		◑	●	●	
M6.03	MECHANICAL DETAILS		◑	●	●	
M6.04	MECHANICAL DETAILS		◑	●	●	●
M7.01	MECHANICAL SCHEDULES		◑	●	●	
M7.02	MECHANICAL SCHEDULES		◑	●	●	
M7.11	MECHANICAL SCHEDULES		◑	●	●	
M7.12	MECHANICAL SCHEDULES		◑	●	●	
M8.01	TEMPERATURE CONTROL STANDARDS AND GENERAL NOTES		◑	●	●	
M8.02	TEMPERATURE CONTROLS		◑	●	●	
M8.03	TEMPERATURE CONTROLS			●	●	
M8.04	TEMPERATURE CONTROLS			●	●	
M8.05	TEMPERATURE CONTROLS			●	●	
M8.06	TEMPERATURE CONTROLS			●	●	
7. PLUMBING						
P2.00	UNDERGROUND PLUMBING PLAN		◑	●	●	
P2.01	FIRST LEVEL PLUMBING PLAN		◑	●	●	●
P2.02	SECOND LEVEL PLUMBING PLAN		◑	●	●	
P2.03	ROOF PLUMBING PLAN		◑	●	●	●
P5.01	ENLARGED PLUMBING PLANS		◑	●	●	●
P6.01	PLUMBING DETAILS		◑	●	●	
P6.02	PLUMBING DETAILS		◑	●	●	
P7.01	PLUMBING SCHEDULES		◑	●	●	
P7.02	PLUMBING SCHEDULES		◑	●	●	
8. ELECTRICAL						
E0.01	ELECTRICAL STANDARDS AND DRAWING INDEX		◑	●	●	
E0.02	ELECTRICAL STANDARD SCHEDULES		◑	●	●	
E0.03	ELECTRICAL SITE PLAN		◑	●	●	
E2.01	FIRST LEVEL LIGHTING PLAN		◑	●	●	
E2.02	SECOND LEVEL LIGHTING PLAN		◑	●	●	
E3.01	FIRST LEVEL POWER PLAN		◑	●	●	●
E3.02	SECOND FLOOR POWER PLAN		◑	●	●	
E4.01	ROOF ELECTRICAL PLAN		◑	●	●	
E5.01	ONE LINE DIAGRAM		◑	●	●	
E5.02	PANEL SCHEDULES		◑	●	●	
E7.01	ELECTRICAL DETAILS AND DIAGRAMS		◑	●	●	
E7.02	ELECTRICAL DETAILS AND DIAGRAMS			●	●	
E7.03	ELECTRICAL DETAILS AND DIAGRAMS			●	●	
E7.04	ELECTRICAL DETAILS AND DIAGRAMS			●	●	
9. FIRE PROTECTION						
FP1.01	FIRE PROTECTION PLANS		◑	●	●	
FP6.01	FIRE PROTECTION DETAILS		◑	●	●	

GENERAL PROJECT NOTES

1. CONSTRUCTION OF THIS PROJECT SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CODES, ORDINANCES AND REGULATIONS.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND EACH SUBCONTRACTOR TO REVIEW, UNDERSTAND AND COORDINATE WORK WITH APPLICABLE CODES, ORDINANCES, REGULATIONS, AND ALL CONTRACT DRAWINGS BEFORE THE INSTALLATION OF THEIR WORK. ANY DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION FOR CLARIFICATION. ANY WORK INSTALLED IN CONFLICT WITH THE ARCHITECTURAL DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT HIS OWN EXPENSE AND AT NO EXPENSE TO THE OWNER, ENGINEER OR ARCHITECT.
3. SCHEDULE AND RECEIVE APPROVAL FROM GOVERNING JURISDICTION AND THE ENGINEER FOR ALL UTILITY INTERRUPTIONS IN ADVANCE OF NEEDED DATE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE REQUIRED NOTIFICATION TIMES WITH EACH GOVERNING JURISDICTION AND/OR UTILITY.
4. CONTRACTOR SHALL VERIFY SIZES AND LOCATIONS OF ALL OPENINGS FOR MECHANICAL EQUIPMENT, ELECTRICAL EQUIPMENT, OWNER SUPPLIED EQUIPMENT, AND OTHER EQUIPMENT, AS WELL AS SHOP DRAWINGS AS REVIEWED BY ARCHITECT OR ENGINEER BEFORE PROCEEDING WITH WORK.
5. CONTRACTOR SHALL VERIFY/ADJUST SIZES AND LOCATIONS OF ALL EQUIPMENT PADS AND BASES, POWER, WATER AND DRAIN INSTALLATION BEFORE PROCEEDING WITH THE WORK. THIS SHALL OCCUR WITH NO ADDITIONAL COST TO OWNER.
6. PROVIDE BLOCKING BEHIND ALL WALL MOUNTED ACCESSORIES AND MILLWORK AS REQUIRED BY APPLICABLE MANUFACTURER RECOMMENDATIONS, AND AS INDICATED BY ARCHITECT DURING SUBMITTAL PROCESS.
7. ALL PENETRATIONS OF FIRE RESISTIVE WALLS SHALL BE PROTECTED BY MATERIALS AND INSTALLATION DETAILS THAT CONFORM TO UNDERWRITERS LABORATORIES' LISTINGS FOR THROUGH PENETRATION FIRE STOP SYSTEM.
8. CONTRACTOR SHALL CONTACT ARCHITECT PRIOR TO FINAL PLACEMENT OF LIGHT FIXTURES AND DIFFUSERS IN ALL CEILINGS AND WALLS. COORDINATE WITH ELECTRICAL PRIOR TO ACOUSTICAL CEILING GRID INSTALLATION.
9. ALL DIMENSIONS ARE FROM FACE OF CONCRETE MASONRY UNIT, BLOCK, STUD OR CENTERLINE OF COLUMNS, UNLESS NOTED OTHERWISE.
10. ALL EXTERIOR WALL & ROOF OPENINGS, FLASHING, COUNTER-FLASHING, EXPANSION JOINTS SHALL BE CONSTRUCTED IN SUCH A MANNER AS TO MAKE THEM WEATHERPROOF AND WATERTIGHT.
11. EACH INSTALLER SHALL BE RESPONSIBLE FOR VERIFICATION AND COORDINATION WITH OTHER INSTALLERS TO SECURE COMPLIANCE OF DRAWING AND SPECIFICATIONS CONCERNING THE ACCURATE LOCATION OF STRUCTURAL MEMBERS AND OPENINGS FOR MR MECHANICAL, ELECTRICAL AND MISCELLANEOUS EQUIPMENT.
12. DO NOT SCALE DRAWINGS. THE CONTRACTOR SHALL USE DIMENSIONS AS SHOWN AND ACTUAL FIELD MEASUREMENT. NOTIFY ARCHITECT OF ANY DISCREPANCIES.
13. RECYCLING- CONTRACTOR IS ENCOURAGED TO RECYCLE ALL MATERIALS POSSIBLE AND TO USE RECYCLED MATERIALS WHERE SUITABLE. CONTRACTOR SHOULD NOTIFY ARCHITECT OF POTENTIAL RECYCLED MATERIALS WHICH MAY BE APPROPRIATE FOR SUBSTITUTION.
14. THIS PROJECT HAS BIDDER DESIGNED AND INSTALLED FEATURES AS NOTED BELOW, TO BE SUBMITTED AS A DEFERRED SUBMITTAL BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR APPLYING FOR AND OBTAINING ALL REQUIRED PERMITS. THE CONTRACTOR IS RESPONSIBLE FOR INCLUDING ALL PREPARATION AND PERMIT REVIEW TIME IN THE PROJECT SCHEDULE. THE CONTRACTOR SHALL HIRE ENGINEERS FOR DELEGATED DESIGN AND PROVIDE REQUIRED STAMPED (BY MI STATE LICENSED ENGINEERS) DRAWINGS AND CALCULATIONS. BIDDER DESIGNED & INSTALLED ITEMS INCLUDE:
    - AUTO. SPRINKLER SYSTEM PER NFPA 13, MBC SECTION 903
    - FIRE ALARM SYSTEM PER SPECIFICATIONS AND REQUIREMENTS

DRAWING SYMBOLS



ABBREVIATIONS

&	AND	C.I.	CAST IRON	E.A.	EXPOSED AGGREGATE	FURR.	FURRING	LAB.	LABORATORY	PERP.	PERPENDICULAR	SBC	SEATTLE BUILDING CODE	T.V.	TELEVISION
∠	ANGLE	C.I.P.	CAST IN PLACE	EA.	EACH	FUT.	FUTURE	LAM.	LAMINATE	PL.	PLATE	S.C.	SOLID CORE	T.O.W.	TOP OF WALL
@	AT	C.J.	CONSTRUCTION/CONTROL JOINT	E.J.	EXPANSION JOINT	F.V.	FIELD VERIFY	LAV.	LAVATORY	P-LAM, P. LAM.	PLASTIC LAMINATE	SCD	SEAT COVER DISPENSER	TYP.	TYPICAL
℄	CENTERLINE	C.L.	CENTERLINE	EL.	ELEVATION			LDRY.	LAUNDRY	PALST.	PLASTER	SCHED.	SCHEDULE		
∅	DIAMETER	CLG.	CEILING	ELEC.	ELECTRICAL	GA.	GAUGE	LKR.	LOCKER	PLYWD.	PLYWOOD	S.D.	SOAP DISPENSER	UNF.	UNFINISHED
#	POUND OR NUMBER	CLKG.	CAULKING	ELEV.	ELEVATOR (OR ELEVATION)	GALV.	GALVANIZED .	L.S. / LSCP	LANDSCAPING	PNL.	PANEL	S.DET. / SD	SMOKE DETECTOR	U.N.O.	UNLESS NOTED OTHERWISE
A.B.	ANCHOR BOLT	CLR.	CLEAR	EMER.	EMERGENCY	GB.	GRAB BAR	LT.	LIGHT	P.P.	POWER POLE	SECT.	SECTION	U.O.N.	UNLESS OTHERWISE NOTED
ACOUST.	ACOUSTICAL	CMU.	CONCRETE MASONRY UNIT	ENCL.	ENCLOSURE	G.F.I.	GROUND FAULT INTERRUPTER			PR.	PAIR	SF	SQUARE FOOT	UR.	URINAL
A.D.	AREA DRAIN	CNTR.	COUNTER	E.P.	ELECTRICAL PANEL	GL.	GLASS	MAX.	MAXIMUM	PRCST.	PRECAST	S.G.	SAFETY GLASS		
A.C.	ASPHALT CONCRETE	C.O.	CASED OPENING OR CLEANOUT	EQ.	EQUAL	GLAM	GLULAM	M.C.	MEDICINE CABINET	PSL	PARALLEL STRAND LUMBER	SH.	SHELF	VAC.	VACUUM
ADJ.	ADJACENT	COL.	COLUMN	EQPT. / EQUIP.	EQUIPMENT	GND.	GROUND	MECH.	MECHANICAL	P.T.	PRESSURE TREATED	SHT.	SHEET	V.B.	VAPOR BARRIER
ADJUST.	ADJUSTABLE	CONC.	CONCRETE	E.W.C.	ELECTRICAL WATER COOLER	GR.	GRADE	MEMB.	MEMBRANE	PT.	POINT	SHTHG/ SHT'G	SHEATHING	VCR	VINYL CARPET REDUCER
A.F.F.	ABOVE FINISH FLOOR	CONN.	CONNECTION	EX. / EXIST.	EXISTING	GLS.	GALVANIZED STEEL	MFR.	MANUFACTURE(R)	PTD	PAINTER	SHWR.	SHOWER	VERT.	VERTICAL
AGGR.	AGGREGATE	CONSTR.	CONSTRUCTION	EXPOS'D	EXPOSED	GWB	GYPSUM WALL BOARD	MH	MANHOLE	PTD	PAPER TOWEL DISPENSER	SIM.	SIMILAR	VEST.	VESTIBULE
AHJ	AUTHORITY HAVING JURISDICTION	CONT.	CONTINUOUS	EXP.	EXPANSION	GYP.	GYPSUM	MIN.	MINIMUM	PTD/R	COMBINATION PAPER TOWEL DISPENSER & RECEPTACLE	SLDS.	SOLID SURFACE	V.T.O.	VENT TO OUTSIDE
A.I.B.	AIR INFILTRATION BARRIER	CORR.	CORRIDOR	EXT.	EXTERIOR	MIR.	MIRROR					SND.	SANITARY NAPKIN DISPENSER		
AL / ALUM.	ALUMINUM	CPT.	CARPET			H.B.	HOSE BIBB	MISC.	MISCELLANEOUS	PTN.	PARTITION	SNR	SANITARY NAPKIN RECEPTACLE	W.	WEST
APC	ACOUSTICAL PANEL CEILING	CRB	CRUSHED ROCK BASE	F.A.	FIRE ALARM	H.C.	HOLLOW CORE	M.O.	MASONRY OPENING	P.T.A.	PAPER TOWEL RECEPTACLE	S.M.	SHEET METAL	W/	WITH
APPROX.	APPROXIMATE	CTR.	CENTER	F.B.	FLAT BAR	HD	HEAD	MTD.	MOUNTED METAL	PRE-FIN	PRE-FINISHED	S.G.G.	SLAB ON GRADE	W.A.B.	WEATHER AIR BARRIER (SAME AS WRB)
ARCH.	ARCHITECTURAL OR ARCHITECT	CTSK.	COUNTERSUNK	FCB	FIBER COMPOSITE BOARD	HDR.	HEADER	MTL. / MET.	METAL			SPEC.	SPECIFICATION	W.R.B.	WEATHERWATER RESISTIVE BARRIER
ASB.	ASBESTOS			F.D.	FLOOR DRAIN	HDWD.	HARDWOOD H	MTRL.	MATERIAL	Q.T.	QUARRY TILE	SQ.	SQUARE	W.C.	WATER CLOSET
ASPH.	ASPHALT	D.B.	DOORBELL	FDN.	FOUNDATION	HDWR.	HARDWARE	MUL.	MULLION	R.	RISER	S.S.	STAINLESS STEEL	WD.	WOOD
		DBL.	DOUBLE	F.E.	FIRE EXTINGUISHER	H.M.	HOLLOW METAL			RAD.	RADIUS	S.SK.	SERVICE SINK	WDW.	WINDOW
BD.	BOARD	DEPT.	DEPARTMENT	F.E.C.	FIRE EXTINGUISHER CABINET	HORIZ.	HORIZONTAL	N.	NORTH	R.D.	ROOF DRAIN	STA.	STATION	W.M.	WATER METER
BITUM.	BITUMINOUS	DEMO.	DEMOLISH, DEMOLITION	F.	FINISH FLOOR	HR.	COHOUR	N.I.C.	NOT IN CONTRACT	RECP.	RECEPTACLE	STD.	STANDARD	W/O	WITHOUT
BLDG.	BUILDING	D.F.	DRINKING FOUNTAIN	FG	FIBER GLASS	H.R.	HANDRAIL	NO.	NUMBER	RECEPT.	RECEPTION	STL.	STEEL	WP.	WATERPROOF
BLK.	BLOCK	DET./DTL.	DETAIL	F.H.	FIRE HYDRANT	HSS	HOLLOW STRUCTURAL SECTION	NOM.	NOMINAL	REF.	REFERENCE	STOR.	STORAGE	W.R.	WATER RESISTANT, WATER-RESISTIVE
BLKG.	BLOCKING	DIA.	DIAMETER	F.H.C.	FIRE HOSE CABINET	HT.	HEIGHT	N.T.S.	NOT TO SCALE	REFR.	REFRIGERATOR	STRL, STRUCT.	STRUCTURAL	WSCT.	WAINSCOT
BLW	BELOW	DIM.	DIMENSION	FIN.	FINISH					REINF.	REINFORCED	SUSP.	SUSPENDED	WT.	WEIGHT
BM.	BEAM	DISP.	DISPENSER	FL., FLR	FLOOR	I.B.C.	INTERNATIONAL BUILDING CODE	O.A.	OVERALL	REQ'D	REQUIRED	SYM.	SYMMETRICAL		
BMK.	BENCHMARK	DN.	DOWN	FLASH.	FLASHING	I.D.	INSIDE DIAMETER (DIM.)	O.H.	OVERHEAD	RESIL.	RESILIENT				
BOT.	BOTTOM	D.O.	DOOR OPENING	FLUOR.	FLUORESCENT	IN.	INCH	OBS.	OBSCURE	RESIST.	RESISTANT	T.B.S.	TO BE SELECTED		
BTWN.	BETWEEN	DP	DEEP	F.O.C.	FACE OF CONCRETE	INCL.	INCLUDE(D)	O.C.	ON CENTER OUTSIDE	RM.	ROOM	T.C.	TOP OF CURB		
		DR.	DOOR	F.O.F.	FACE OF FINISH	INSUL.	INSULATION	O.D.	DIAMETER (DIM.) O.D.	R.O.	ROUGH OPENING	TEL.	TELEPHONE		
CAB.	CABINET	D.S.	DOWNSPOUT	F.O.S.	FACE OF STUDS	INT.	INTERIOR	OF.	OVERFLOW O.F.	R. & S.	ROD & SHELF	TEMP	TEMPORARY		
C.B.	CATCH BASIN	D.S.P	DRY STANDPIPE	F.P.	FIREPLACE			OFCI	OWNER FURNISH/ CONTRACTOR INSTALL	RGSTR.	REGISTER	TER.	TERRAZZO		
CEM.	CEMENT	D.W.	DISHWASHER	FPRF.	FIREPROOF	JAN.	JANITOR			RSP	RIGID SHEET PANEL	T&G	TONGUE & GROOVE		
CER.	CERAMIC	DWG.	DRAWING	FRP	FIBERGLASS REINFORCED PANEL	JST.	JOIST	OFF.	OFFICE	WD.	REDWOOD	THK.	THICK		
C.F.M.	CUBIC FEET/MIN.	DWR.	DRAWER	F.S.	FULL SIZE	JT.	JOINT	OPNG.	OPENING	R.W.L.	RAIN WATER LEADER	T.O.	TOP OF		
C.G.	CORNER GUARD			FT.	FOOT OR FEET			OPP.	OPPOSITE			T.P.	TOP OF PAVEMENT		
CH.	CHALK	E.	EAST	FTG.	FOOTING	KIT.	KITCHEN	O/	OVER	S.	SOUTH	TPD	TOILET PAPER DISPENSER		
								OF/CI	OWNER FURNISHED/ CONTRACTOR INSTALLED			TRD. OR T	TREAD		

TCA
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23
Design Development	05/26/23
Site Plan Approval	09/22/22

Drawn TCA/A3C Checked TCA/A3C

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

SHEET INDEX

A3C
COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.o3c.com

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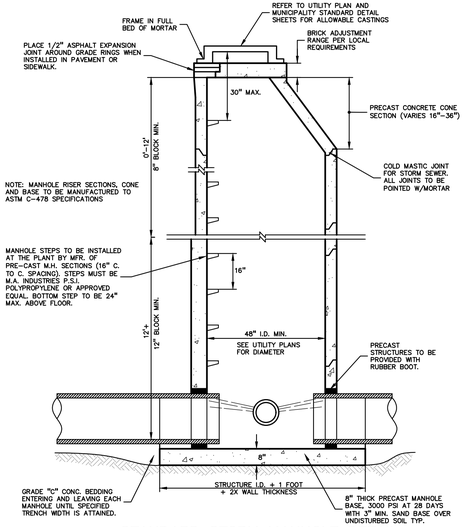
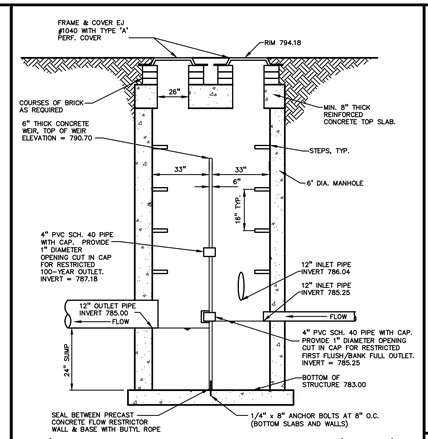


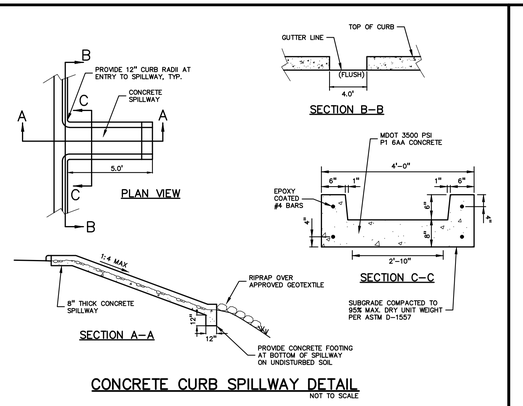
STANDARD STORM MANHOLE DETAIL

NOT TO SCALE



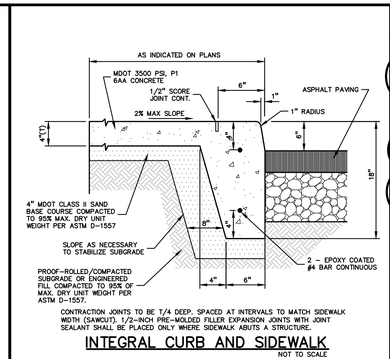
6' DIA. OUTLET CONTROL STRUCTURE (OC#41)

NOT TO SCALE



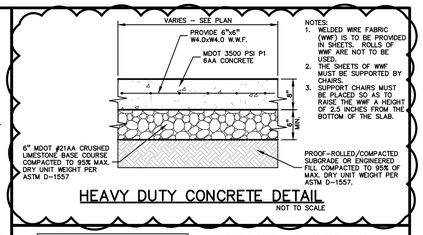
CONCRETE CURB SPILLWAY DETAIL

NOT TO SCALE



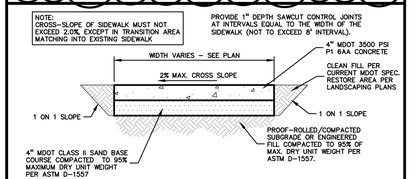
INTEGRAL CURB AND SIDEWALK

NOT TO SCALE



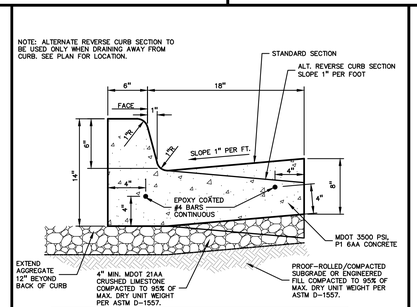
HEAVY DUTY CONCRETE DETAIL

NOT TO SCALE



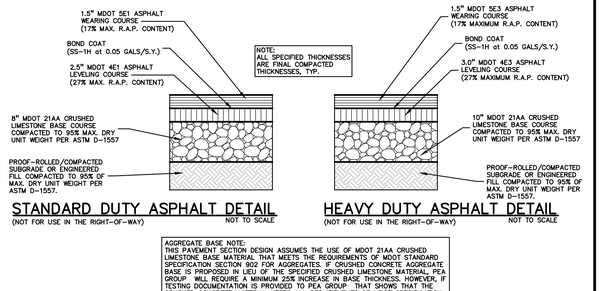
CONCRETE SIDEWALK

NOT TO SCALE



24"x6" STANDARD CONCRETE CURB AND GUTTER

NOT TO SCALE



STANDARD DUTY ASPHALT DETAIL

(NOT FOR USE IN THE RIGHT-OF-WAY)

NOT TO SCALE

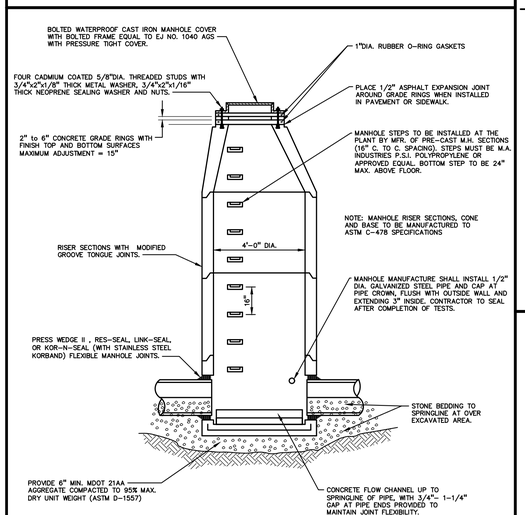
HEAVY DUTY ASPHALT DETAIL

(NOT FOR USE IN THE RIGHT-OF-WAY)

NOT TO SCALE

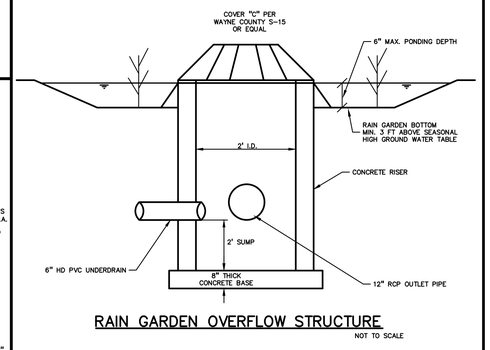
AGGREGATE BASE NOTE:
THIS PAVEMENT SECTION DESIGN ASSUMES THE USE OF MDOT 21AA CRUSHED LIMESTONE BASE MATERIAL THAT MEETS THE REQUIREMENTS OF MDOT STANDARD SPECIFICATION SECTION 902 FOR AGGREGATES. IF CRUSHED CONCRETE AGGREGATE BASE IS PROPOSED IN LIEU OF THE SPECIFIED CRUSHED LIMESTONE MATERIAL, PEA GROUP WILL REQUIRE A MINIMUM 25% INCREASE IN BASE THICKNESS. HOWEVER, IF TESTING DOCUMENTATION IS PROVIDED TO PEA GROUP THAT SHOWS THAT THE CRUSHED CONCRETE MATERIAL MEETS ALL REQUIREMENTS OF MDOT SPECIFICATION SECTION 902, THEN THE 25% INCREASE IN THICKNESS MAY BE REEVALUATED.

ASPHALT MATERIAL NOTES:
HOT-MIX ASPHALT MIXTURES UTILIZING RECYCLED ASPHALT PAVEMENT (RAP) MUST MEET MDOT SPECIAL PROVISION 12SP501(E). THE BINDER GRADE FOR THIS WORK IS PG64-28. IF ASPHALT MIXES CONTAINING RAP ARE TO BE SUPPLIED FOR THIS PROJECT, THE ASPHALT BINDER MUST BE REVISED PER MDOT TIER 1' OR TIER 2' REQUIREMENTS (RAP CONTENT UP TO 27% MAXIMUM). TIER 3 MIXES ARE NOT ACCEPTABLE ON THIS PROJECT. AN ASPHALT MIX DESIGN FOR ALL SPECIFIED MIXES SHOULD BE FORWARDED TO PEA GROUP FOR REVIEW PRIOR TO CONSTRUCTION.



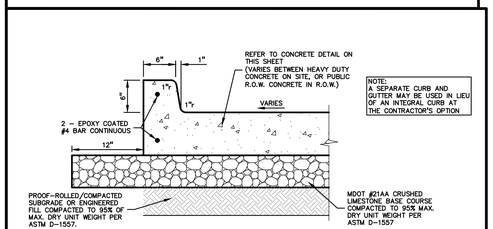
STANDARD SANITARY SEWER MANHOLE DETAIL (ON 8" THROUGH 24" DIAMETER)

NOT TO SCALE



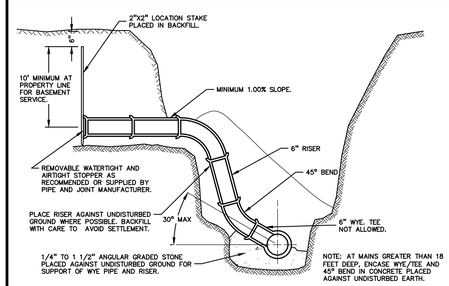
RAIN GARDEN OVERFLOW STRUCTURE

NOT TO SCALE



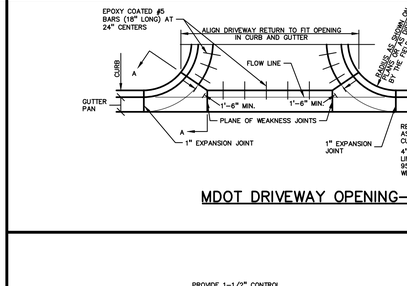
CONCRETE PAVEMENT WITH INTEGRAL CURB

NOT TO SCALE



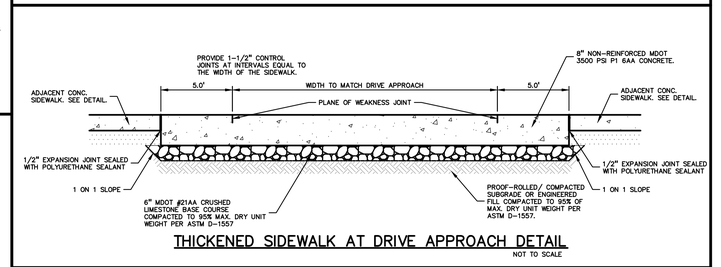
BUILDING LEAD RISER DETAIL

NOT TO SCALE



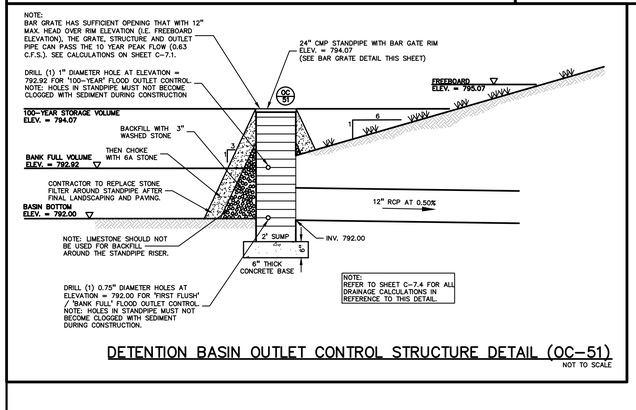
MDOT DRIVEWAY OPENING-DETAIL 'M'

NOT TO SCALE



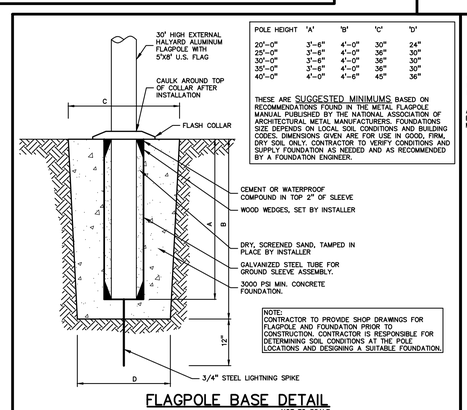
THICKENED SIDEWALK AT DRIVE APPROACH DETAIL

NOT TO SCALE



DETENTION BASIN OUTLET CONTROL STRUCTURE DETAIL (OC-51)

NOT TO SCALE



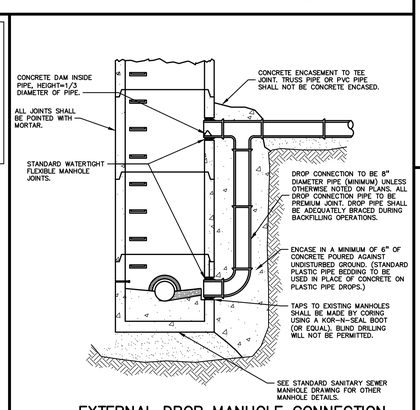
POLE HEIGHT	'A'	'B'	'C'	'D'
20'-0"	3'-6"	4'-0"	30"	24"
25'-0"	3'-6"	4'-0"	36"	30"
30'-0"	3'-6"	4'-0"	36"	30"
35'-0"	3'-6"	4'-0"	36"	30"
40'-0"	4'-0"	4'-6"	45"	36"

THESE ARE SUGGESTED MINIMUMS BASED ON RECOMMENDATIONS FOUND IN THE METAL FLAGPOLE MANUAL PUBLISHED BY THE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS. FOUNDATIONS SIZE DEPENDS ON LOCAL SOIL CONDITIONS AND BUILDING CODES. DIMENSIONS GIVEN ARE FOR USE IN GOOD, FIRM, DRY SOIL ONLY. CONTRACTOR TO VERIFY CONDITIONS AND SUPPLY FOUNDATION AS NEEDED AND AS RECOMMENDED BY A FOUNDATION ENGINEER.

NOTE:
CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR FLAGPOLE AND FOUNDATION PRIOR TO CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR DETERMINING SOIL CONDITIONS AT THE POLE LOCATIONS AND DESIGNING A SUITABLE FOUNDATION.

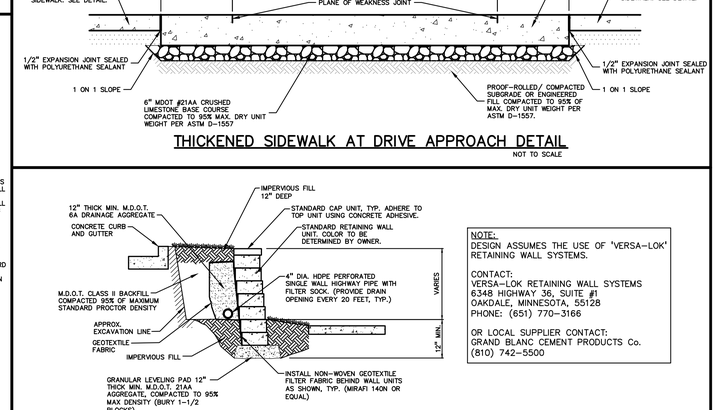
FLAGPOLE BASE DETAIL

NOT TO SCALE



EXTERNAL DROP MANHOLE CONNECTION

NOT TO SCALE



NOTE:
DESIGN ASSUMES THE USE OF 'VERSA-LOK' RETAINING WALL SYSTEMS.

CONTACT:
VERSA-LOK RETAINING WALL SYSTEMS
6348 HIGHWAY 36, SUITE #1
OAKDALE, MINNESOTA, 55128
PHONE: (651) 770-3166

OR LOCAL SUPPLIER CONTACT:
GRAND BLANC CEMENT PRODUCTS Co.
(810) 742-5500

SEGMENTED RETAINING WALL

NOT TO SCALE

T C A
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
JOSEPH B. WYWROT
ENGINEER
No. 6201040674
LICENSED PROFESSIONAL ENGINEER

PEA GROUP
t: 844.813.2949
www.peagroup.com

PROJECT NUMBER	21018

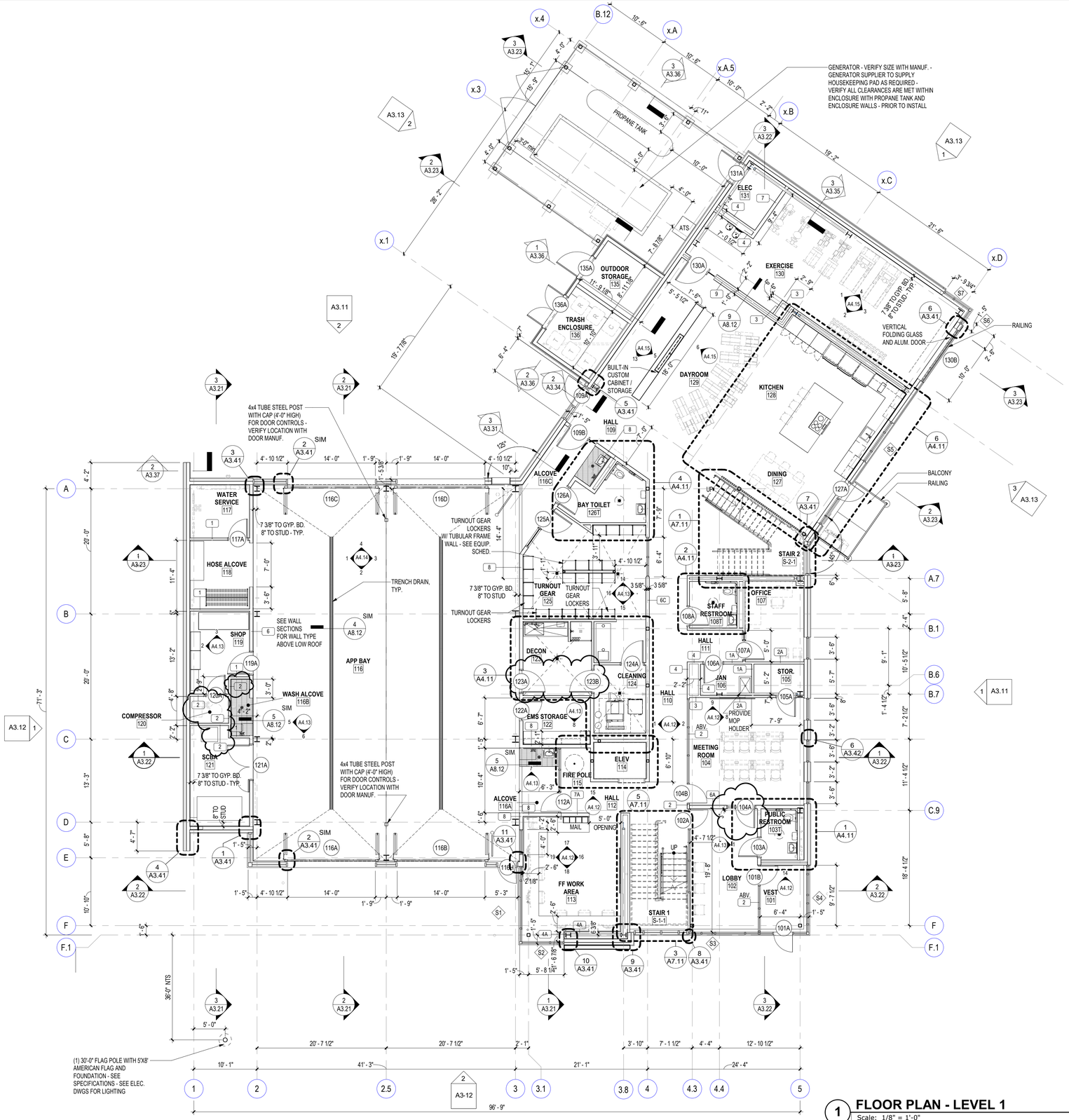
ISSUE		
	Addendum #1	11.11.24
	Engineering Review	10.30.24
	Bids/Permits	10.11.24
	Site Plan-Engineering	08.21.24
	Final Site Plan-Rev	11.08.23
	Final Site Plan	09.08.23
	Bids/Permits	08.04.23
	WCWRC Resubmittal	01.13.23

DRN: JW CHK'D: JC

DETAILS

A 3 C
COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

SHEET C-8.2



LEGEND

- 1/2 HR SEPARATION - CONT. TO UNDERSIDE OF FLOOR/ ROOF ASSEMBLY - SEE CODE COMPLIANCE SHEET G0.11
- ### — REFERENCED DOOR TYPE AND SCHEDULE
- # — REFERENCED WALL TYPES
- A — REFERENCED WINDOW TYPES

GENERAL NOTES - FLOOR PLANS

1. SEE G0.02 - SHEET INDEX FOR GENERAL PROJECT NOTES, LEGENDS AND ABBREVIATIONS.
2. SEE A5.11 - ADA CODE SHEET FOR TYPICAL ACCESSIBLE MOUNTING HEIGHTS.
3. SEE G0.04 FOR WALL PARTITION TYPES.
4. DIMENSIONS ARE FACE OF GYPSUM BOARD, UNLESS NOTED OTHERWISE.
5. DOOR JAMBS (HINGE SIDE) SHALL BE 6" FROM CORNER IN STUD PARTITIONS UNLESS NOTED OTHERWISE.
6. REFER TO DETAILS FOR ADDITIONAL DIMENSIONING INFORMATION.
7. REFER TO ENLARGED PLANS FOR PARTITION TYPES AND DIMENSION IN AREAS WHICH ARE DETAILED AT A LARGER SCALE.
8. CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF OWNER PROVIDED EQUIPMENT INCLUDED BUT NOT LIMITED TO DIMENSIONAL INFORMATION, AND MECHANICAL, ELECTRICAL AND PLUMING REQUIREMENTS.
9. SEE INTERIOR ELEV. FOR GROMMETS IN CASEWORK.
10. PROVIDE DEPRESSED SLAB AT WASH ALCOVE AND SHOWERS TYP. (SEE STRUCT. FOUNDATION PLAN FOR SLAB THICKNESS).
11. COORDINATE AND PROVIDE BACKING AND BLK'G REQ'D FOR CABINETS, GRAB BARS, HANDRAILS, MARKER BOARDS, TACK BOARDS, SHELVING AND OTHER EQUIPMENT AND HARDWARE PRIOR TO INSTALLING G.W.B. - CONT. X 6" 16 GA. FLAT STRAP W/ 2X6 MIN WOOD BLK'G REQUIRED AT ALL GRAB BARS AND HANDRAIL LOCATIONS. CONT. X 8" 16 GA. FLAT STRAP BACKING OK AT ALL OTHER LOCATIONS.
12. PROVIDE WALL TO WALL SLOPED FLOORS AT TRENCH DRAINS AT APPARATUS BAYS
13. PROVIDE BLOCK OUTS AT EXTERIOR DOORS AND APPARATUS BAY DOORS TO POUR SLAB THROUGH OPENING WITH A SINGLE EXPANSION JOINT AS INDICATED
14. WHERE CONTROL JOINTS TERMINATE AT AN INTERSECTING JOINT, HOLD SHORT AND FINISH WITH HAND SAW. OVERLAPPING SAW CUTS ARE NOT ALLOWED. CONTRACTOR TO PROVIDE A JOINT LAYOUT PLAN PRIOR TO PROCEEDING WITH THE WORK.
15. COORDINATE AND PROVIDE BACKING & BLK'G REQ'D FOR CABINETS AND HARDWARE PRIOR TO INSTALLING G.W.B.
16. SEE G0.04 FOR WALL TYPES.
17. SEE ENLARGED PLANS FOR WALL TYPES IN THOSE AREAS
18. REFER TO CODE COMPLIANCE PLANS FOR FIRE EXTINGUISHER CABINETS AND RATED WALL LOCATIONS.

1 **FLOOR PLAN - LEVEL 1**
Scale: 1/8" = 1'-0"

0 4' 8' 16'

PROJECT TRUE 35°

TCA
ARCHITECTURE + PLANNING + DESIGN

DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT
STATE OF MICHIGAN

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23
Final Site Plan	09/08/23
Design Development	05/26/23
Site Plan Approval	11/22/22
Site Plan Approval	09/22/22

Drawn TCA/A3C Checked TCA/A3C

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

FIRST LEVEL FLOOR PLAN

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

Sheet A2.11

11/11/2024 2:23:39 PM

DOOR SCHEDULE

	DOOR								FRAME				DETAILS				HARDWARE
MARK	WIDTH	HEIGHT	THICKNESS	TYPE	MATERIAL	FINISH	GLAZING	LABEL	TYPE	MATERIAL	FINISH	GLAZING	HEAD	JAMB	SILL	REMARKS	SET
101A	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T/I)		--	ALUM	FAC	(T/I)	5/A3.43	---	9/A2.22	3, 4	AL1
101B	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T)		5	ALUM	FAC	(T)	7/A2.22	8/A2.22	1/A2.22		AL2
102A	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T)		7	ALUM	FAC	(T)	7/A2.22	8/A2.22	---	3	AL3
103A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		01
104A	3' - 0"	7' - 0"	1 3/4"	D	WD	FAC	(T)		2	HM	PAINT	(T)	4/A2.22	2/A2.22	1/A2.22		02
104B	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T)		--	ALUM	FAC	(T)	7/A2.22	8/A2.22	1/A2.22	3, 5, 6	AL4
105A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	1/A2.22		03
106A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		04
107A	3' - 0"	7' - 0"	1 3/4"	D	WD	FAC	(T)		2	HM	PAINT	(T)	4/A2.22	2/A2.22	1/A2.22		05
108A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		06
109A	3' - 6"	7' - 0"	1 3/4"	E	ALUM	FAC	(TI/TR)		--	ALUM	FAC	(TI/TR/ISP)	---	5/A3.41	9/A2.22	3, 4	AL1
109B	3' - 6"	7' - 0"	1 3/4"	D	HM	PAINT	(T/I)		2	HM	PAINT	(T/I)	4/A2.22	2/A2.22	---	7	07
112A	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T/I)		6	ALUM	FAC	(T/I)	7/A2.22	8/A2.22	---	7	AL5
116A	14' - 0"	14' - 0"	2"	F	STL	FAC	(T/I)		-	STL	PAINT	-	3/A3.43	2/A3.41	5/A2.22		-
116B	14' - 0"	14' - 0"	2"	F	STL	FAC	(T/I)		-	STL	PAINT	-	3/A3.43	2/A3.41	5/A2.22		-
116C	14' - 0"	14' - 0"	2"	F	STL	FAC	(T/I)	-	-	STL	PAINT	-	3/A3.43	2/A3.41	5/A2.22		-
116D	14' - 0"	14' - 0"	2"	F	STL	FAC	(T/I)	-	-	STL	PAINT	-	3/A3.43	2/A3.41	5/A2.22		-
116H	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T/I)		--	ALUM	FAC	(T/I)	---	---	9/A2.22	3, 4	AL1
117A	3' - 0"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		04
119A	3' - 6"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		08
120A	3' - 0"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		04
121A	3' - 6"	7' - 0"	1 3/4"	B	HM	PAINT	-		3	HM	PAINT	-	4/A2.22	2/A2.22	---	1, 2	09
122A	3' - 0"	7' - 0"	1 3/4"	C	HM	PAINT	(T)		1	HM	PAINT	(T)	4/A2.22	2/A2.22	---		04
123A	3' - 6"	7' - 0"	1 3/4"	C	HM	PAINT	(T)		1	HM	PAINT	(T)	4/A2.22	2/A2.22	---		10
123B	3' - 6"	7' - 0"	1 3/4"	D	HM	PAINT	(T)		1	HM	PAINT	-	4/A2.22	2/A2.22	---		10
124A	3' - 6"	7' - 0"	1 3/4"	D	HM	PAINT	(T)		1	HM	PAINT	-	4/A2.22	2/A2.22	---		10
125A	3' - 6"	7' - 0"	1 3/4"	D	HM	PAINT	(T)		4	HM	PAINT	(T)	4/A2.22	2/A2.22	---		08
126A	3' - 0"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		06
127A	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T/I)		--	ALUM	FAC	(T/I)	5/A3.43 SIM	16/A2.22	9/A2.22 SIM	4	AL6
130A	3' - 6"	7' - 0"	1 3/4"	D	HM	PAINT	(T/I)		2	HM	PAINT	(T/I)	14/A2.22	15/A2.22	3/A2.22		11
130B	10' - 0"	10' - 0"	1 3/4"	G	ALUM	FAC	(T/I)		--	ALUM	FAC	(T/I)	2/A3.43	6/A3.41	1/A3.34		-
131A	3' - 6"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	10/A2.22	11/A2.22	9/A2.22 SIM		12
135A	4' - 0"	7' - 0"	1 3/4"	A	HM	PAINT	-		1	HM	PAINT	-	12/A2.22	13/A2.22	9/A2.22 SIM		13
136A	3' - 0"	7' - 0"	1 3/4"	A1	HM	PAINT	-		3	HM	PAINT	-	12/A2.22	13/A2.22	9/A2.22 SIM	1	14
201A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		10
202A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		04
203A	4' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		15
205A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		16
206A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		16
207A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		16
208A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
209A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
210A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
211A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
212A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
213A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-	20 MIN.	1	HM	PAINT	-	4/A2.22	2/A2.22	---		17
215A	3' - 0"	7' - 0"	1 3/4"	E	ALUM	FAC	(T)		5	ALUM	FAC	(T)	7/A2.22	8/A2.22	---		AL2
217A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		08
218A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---	3	18
219A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---	3	18
221A	3' - 0"	7' - 0"	1 3/4"	A	WD	FAC	-		1	HM	PAINT	-	4/A2.22	2/A2.22	---		08

DOOR SCHEDULE KEY

DOOR & FRAME DESIGNATIONS	
WD	SOLID CORE WOOD
HM	HOLLOW METAL
MTL	METAL
STL	STEEL
ALUM	ALUMINUM
FAC	FACTORY FINISH
PAINT	PAINTED
-	-
-	-

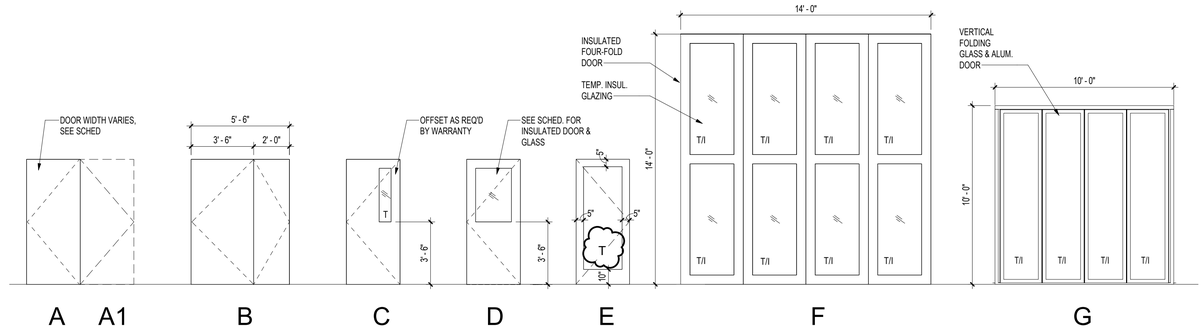
GLAZING DESIGNATIONS	
T	TEMPERED
I	INSULATED
F	FIRE RATED
TR	TRANSLUCENT
SP	SPANDREL PANEL
-	-
-	-
-	-
-	-

DOOR SCHEDULE REMARKS
1. PAIR OF DOORS
2. SMALL LEAF 2'-0"
3. CARD READER
4. SEE EXTERIOR ELEVATIONS FOR FRAME
5. SEE INTERIOR ELEVATIONS FOR FRAME
6. APPLY FROSTED FILM TO WINDOW AND DOOR - SEE INTERIOR ELEVATIONS
7. INSULATED DOOR AND GLASS

DOOR SCHEDULE GENERAL NOTES:
-FILL ALL FRAMES WITH MINERAL WOOL
-REFER TO PROJECT MANUAL FOR HARDWARE SPECIFICATIONS AND SCHEDULE

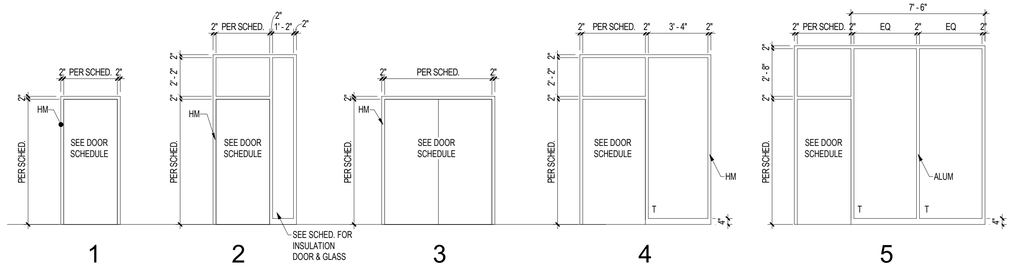
GENERAL NOTES - DOORS

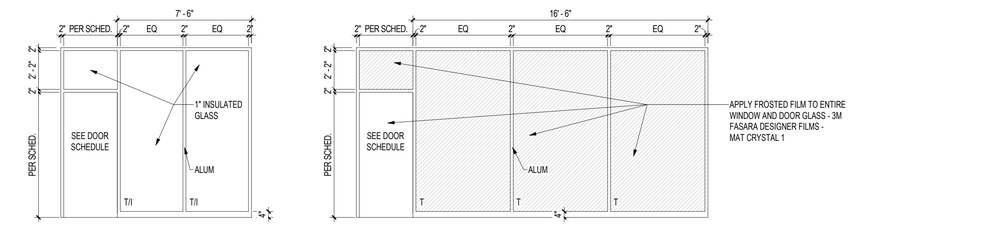
1. ALL SWING DOORS TO BE 1 3/4" THICK UNLESS NOTED OTHERWISE.
2. ALL DOORS SHALL BE 3/4" UNDERCUT (TYPICAL) EXCEPT WHERE THERE IS A BOTTOM FRAME/THRESHOLD OR SPECIALLY NOTED OTHERWISE.
3. GLAZING NOTES ON DOOR SCHEDULE IS FOR THE DOOR AND BORROWED LIGHT IN THE FRAME TYPICAL.
4. SEE SPECIFICATIONS FOR GLAZING TYPES AND INFORMATION.
5. GLAZING TO BE FREE OF STAMPS, MARKINGS, ETC. UNLESS REQUIRED BY CODE TO IDENTIFY A RATING.
6. GLAZING STOPS ON BORROWED LIGHTS SHALL BE LOCATED ON THE ROOM SIDE OF THE FRAME. BUTT JOINT ALL GLAZING STOP TIGHT TO FRAME FOR A CLEAN, FINISHED APPEARANCE.
7. CAULK PERIMETER OF DOOR AND WINDOW FRAMES TO THE WALL. MATCH FRAME COLOR.
8. CAULK EDGES AND VOIDS ALONG WINDOW STOPS OF HOLLOW MENTAL FRAMES PRIOR TO PAINTING TO PROVIDE A CLEAN FINISHED APPEARANCE.
9. ALL LABELS ON RATED DOORS TO BE FREE OF PAINT AND CLEARLY VISIBLE UPON INSPECTION.
10. SEE ELECTRICAL DRAWING FOR OPENINGS THAT REQUIRE POWER AND / OR DATA CONNECTIONS.



1 DOOR TYPES LEGEND

Scale: 1/4" = 1'-0"





2 FRAME TYPES

Scale: 1/4" = 1'-0"

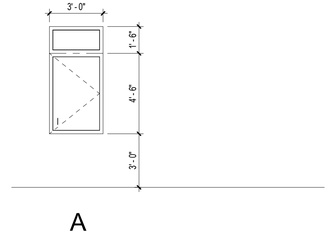
OPENING COVERING SCHEDULE KEY

TYPE 1	BLACK-OUT SOLAR SHADE
TYPE 2	SOLAR SHADE 1% OPENNESS
TYPE 3	SOLAR SHADE 3% OPENNESS

OPENING COVERING SCHEDULE:

ROOM NUMBER	OPENING COVERING TYPE	NUMBER OF WINDOWS
104	2	3
107	3	1
127/128	3	WHOLE WINDOW SYSTEM & DOOR
208	1	1
209	1	1
210	1	1
211	1	1
212	1	1
213	1	1

OPENING COVERING SCHEDULE GENERAL NOTES:
1. INTERIOR WINDOW COVERINGS REQUIRED AT ALL EXTERIOR GLAZING ASSOCIATED WITH DOOR AND FRAME TYPES U.N.O. INCLUDING: DOORS, TRANSOMS, WINDOWS AND SIDELITES.
2. SEE EXTERIOR AND INTERIOR ELEVATIONS FOR WINDOW AND FRAME TYPES AND FOR FURTHER NOTES.
3. NO MOTORIZED, ALL MANUAL.



3 WINDOW TYPES

Scale: 1/4" = 1'-0"

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STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23
Design Development	05/26/23

Drawn TCA/A3C Checked TCA/A3C

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

DOOR SCHEDULE, DOOR & FRAME TYPES

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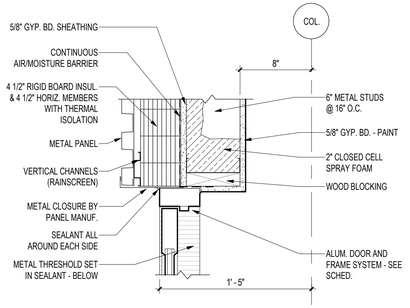
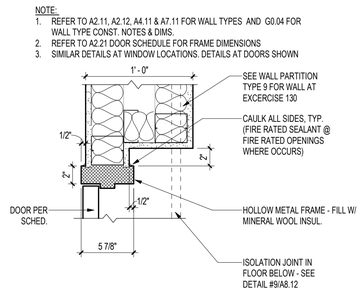
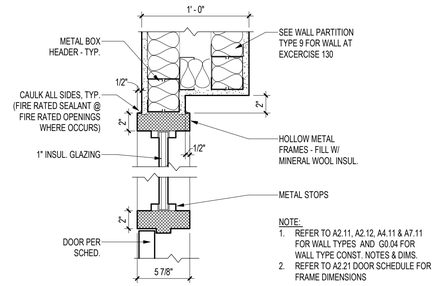


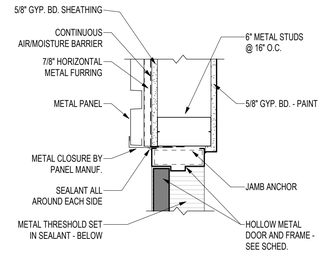
16 JAMB DETAIL
Scale: 1 1/2" = 1'-0"



15 JAMB DETAIL
Scale: 1 1/2" = 1'-0"



14 HEAD DETAIL
Scale: 1 1/2" = 1'-0"



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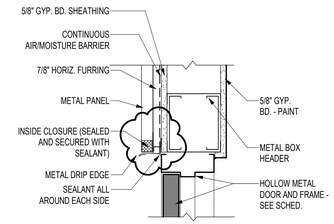
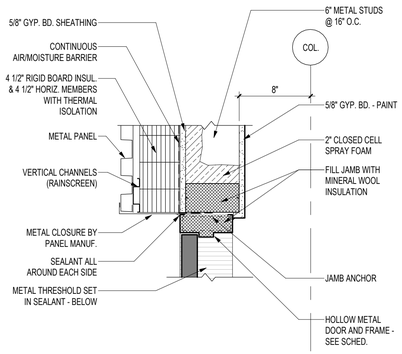
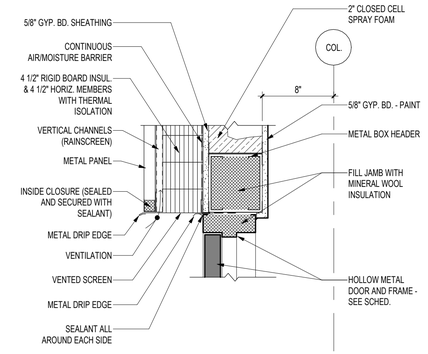
Scale: 1 1/2" = 1'-0"



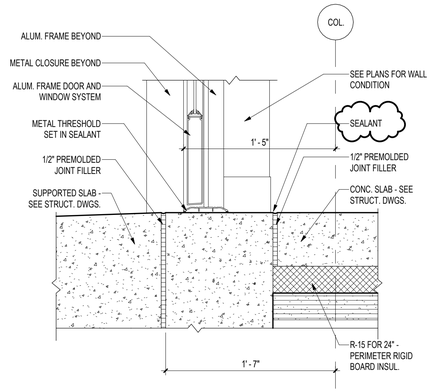
12 HEAD DETAIL
Scale: 1 1/2" = 1'-0"



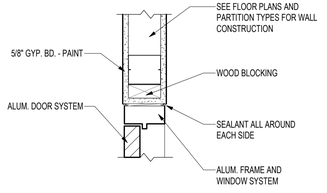
11 JAMB DETAIL
Scale: 1 1/2" = 1'-0"



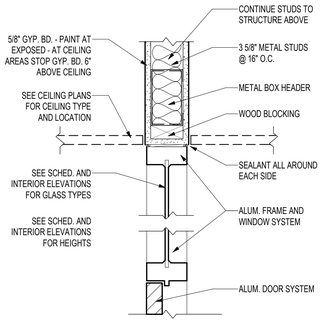
10 HEAD DETAIL
Scale: 1 1/2" = 1'-0"



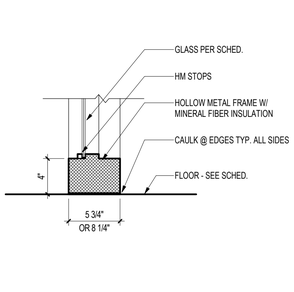
9 SILL DETAIL
Scale: 1 1/2" = 1'-0"



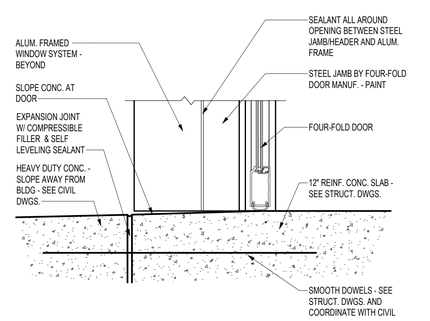
8 INT. ALUM. JAMB
Scale: 1 1/2" = 1'-0"



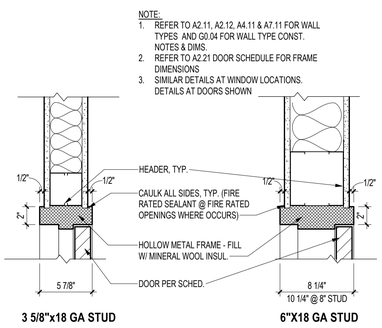
7 INT. ALUM. HEAD
Scale: 1 1/2" = 1'-0"



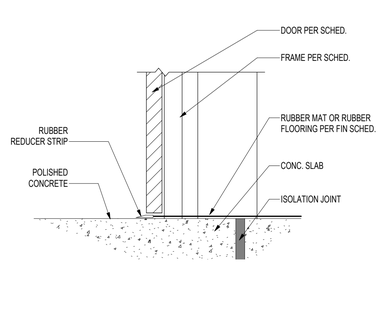
6 INT. HM. SILL
Scale: 1 1/2" = 1'-0"



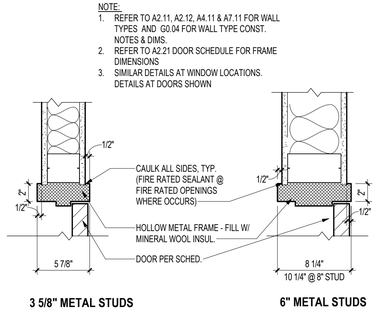
5 BAY DOOR THRESHOLD
Scale: 1 1/2" = 1'-0"



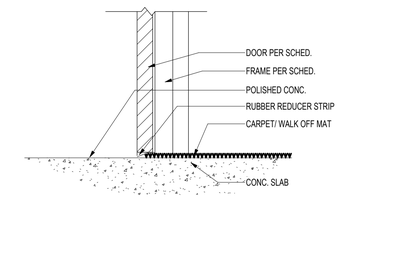
4 INT. HM HEAD
Scale: 1 1/2" = 1'-0"



3 THRESHOLD TRANSITION DETAIL
Scale: 1 1/2" = 1'-0"



2 INT. HM JAMB
Scale: 1 1/2" = 1'-0"



1 THRESHOLD DETAIL
Scale: 1 1/2" = 1'-0"

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STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23

Drawn: KJ/FEA Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

INTERIOR DOOR & WINDOW DETAILS

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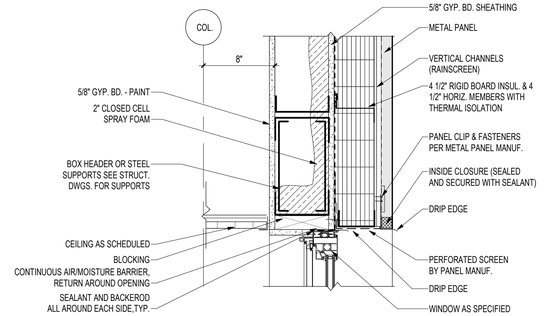
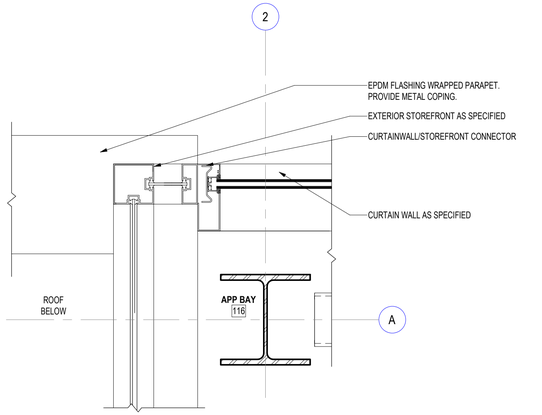


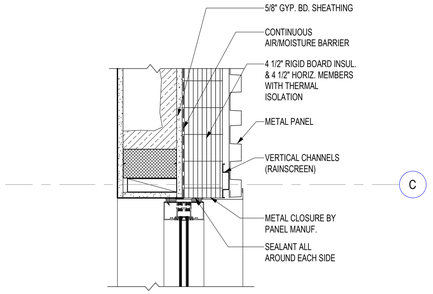
8 WINDOW A - HEADER

Scale: 1 1/2" = 1'-0"



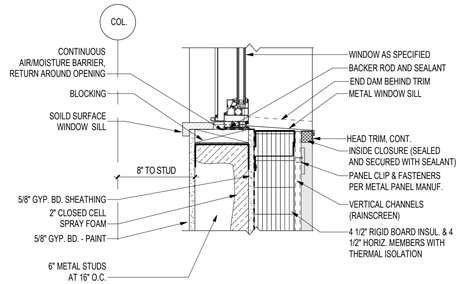
7 LEVEL 2 - COL 2/A

Scale: 1 1/2" = 1'-0"



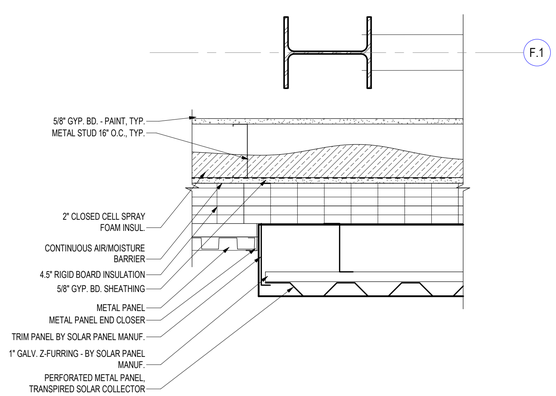
6 LEVEL 1 - WINDOW JAMB

Scale: 1 1/2" = 1'-0"



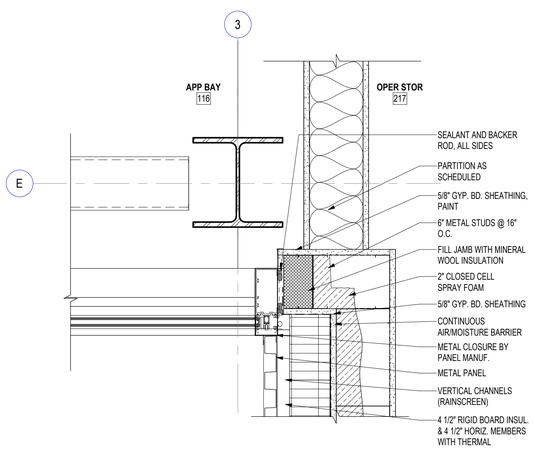
5 WINDOW A - SILL

Scale: 1 1/2" = 1'-0"



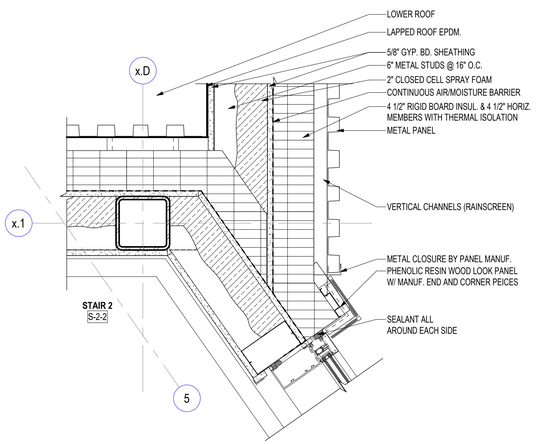
4 PLAN DETAIL

Scale: 1 1/2" = 1'-0"



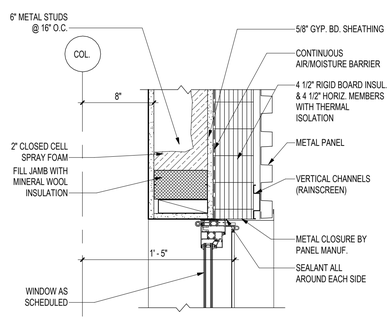
3 PLAN DETAIL

Scale: 1 1/2" = 1'-0"



2 PLAN DETAIL

Scale: 1 1/2" = 1'-0"



1 LEVEL 2 - WINDOW A - JAMB

Scale: 1 1/2" = 1'-0"

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DONALD F. BARRY
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Drawn: SAD Checked: FEA

City of Ann Arbor
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ANN ARBOR, MI 48104

EXTERIOR DETAILS

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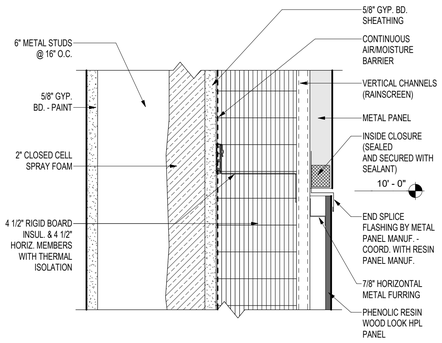
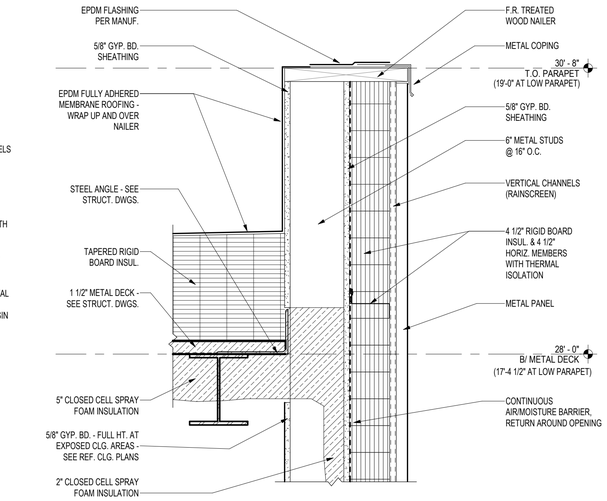


9 WALL SECTION DETAIL - TRANSITION

Scale: 3" = 1'-0"

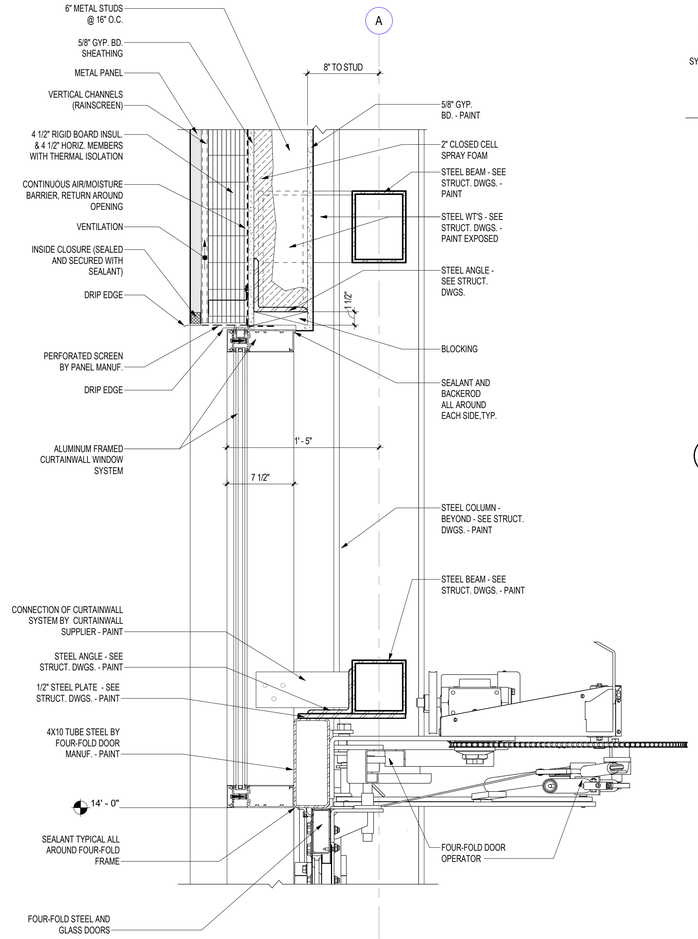


6 WALL SECTION DETAIL - PARAPET

Scale: 1 1/2" = 1'-0"

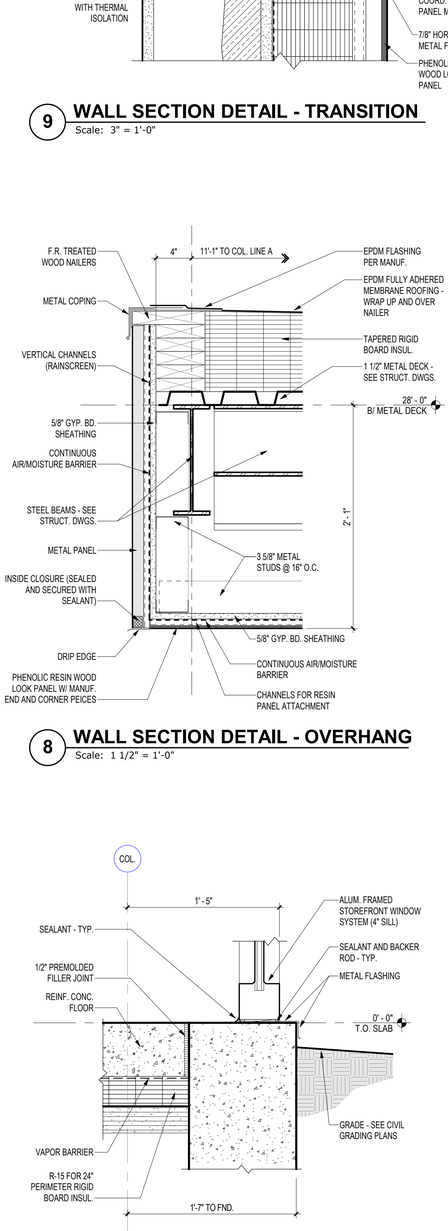
8 WALL SECTION DETAIL - OVERHANG

Scale: 1 1/2" = 1'-0"



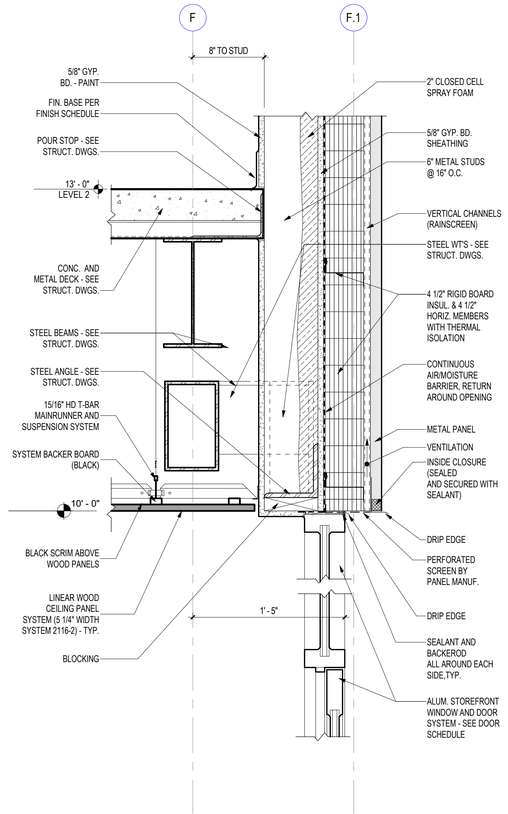
3 DETAIL HEAD FOUR-FOLD

Scale: 1 1/2" = 1'-0"



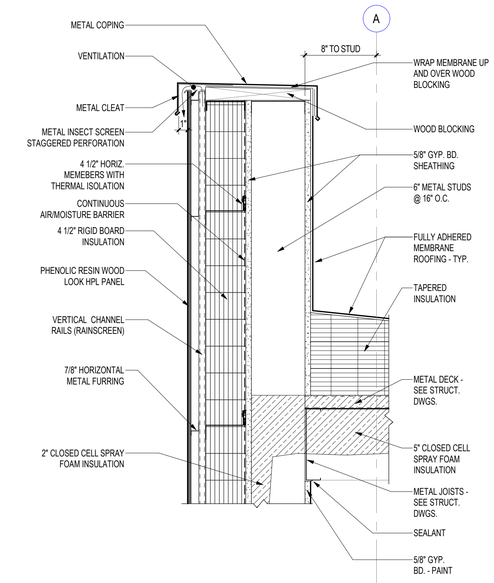
7 WALL SECTION DETAIL - TYP. SILL

Scale: 1 1/2" = 1'-0"



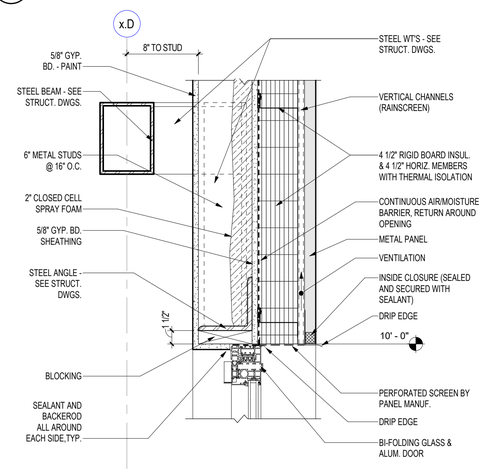
5 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



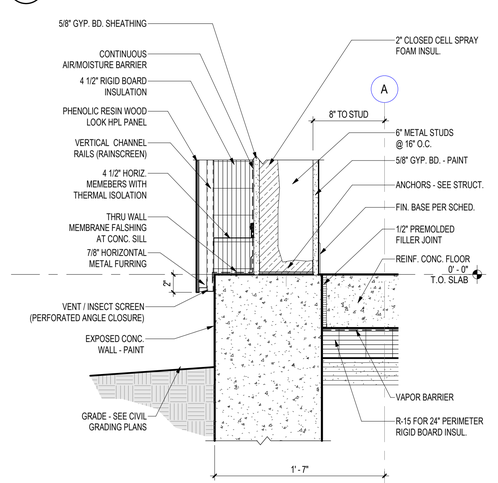
4 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



2 DETAIL HEAD

Scale: 1 1/2" = 1'-0"



1 DETAIL BASE

Scale: 1 1/2" = 1'-0"

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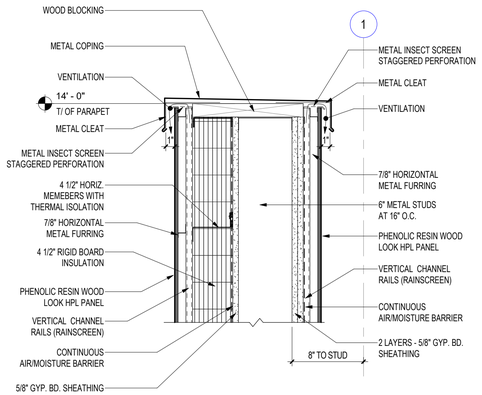
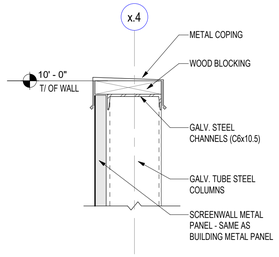


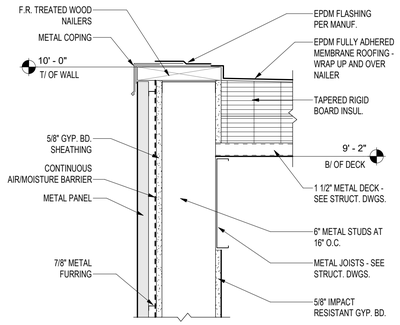
11 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



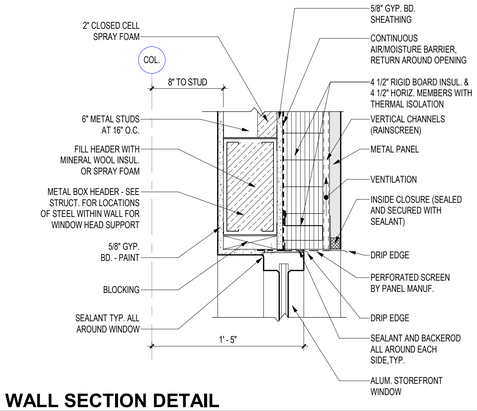
9 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



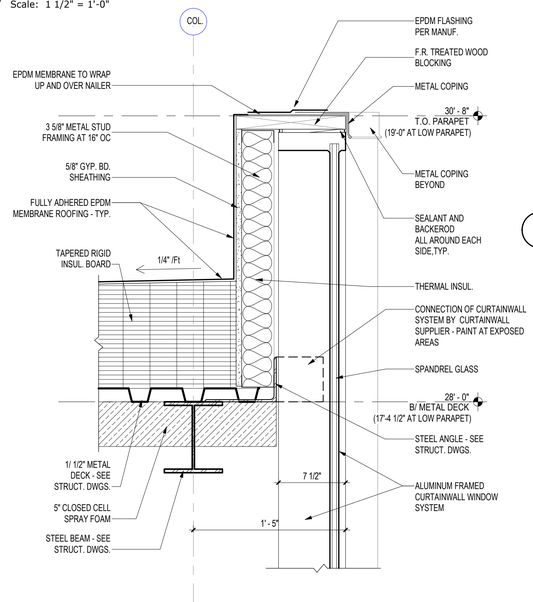
8 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



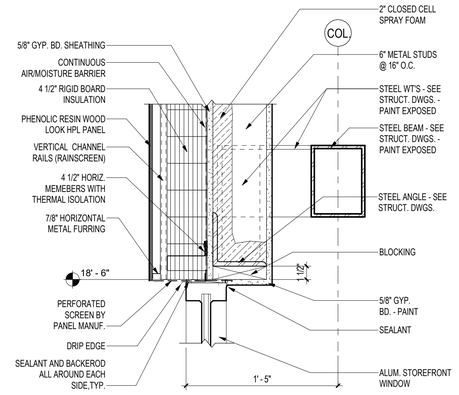
6 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



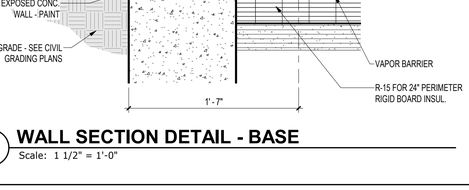
5 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



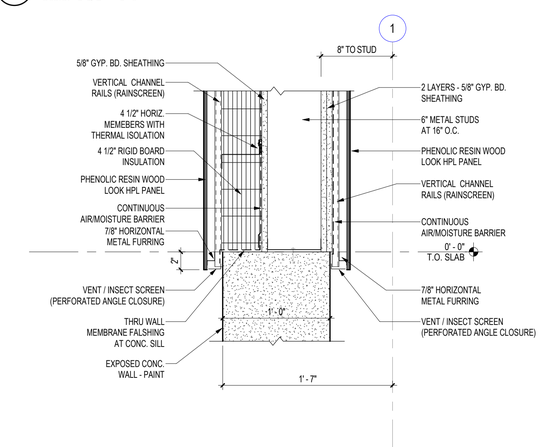
3 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



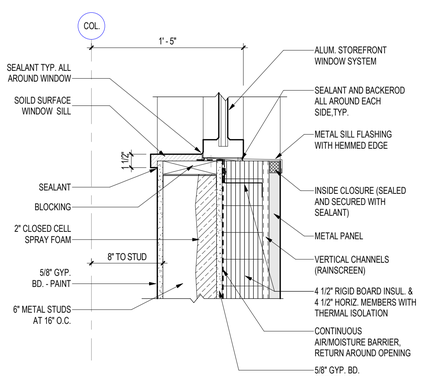
2 PANEL TRANSITION DETAIL

Scale: 3" = 1'-0"



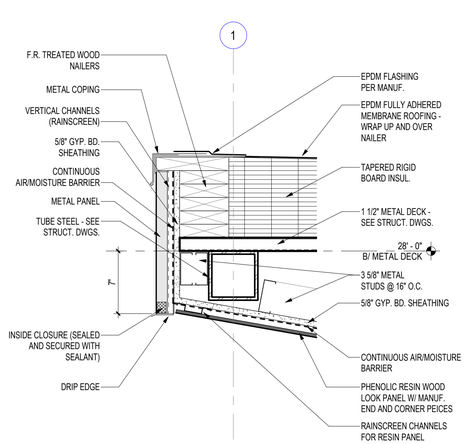
10 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



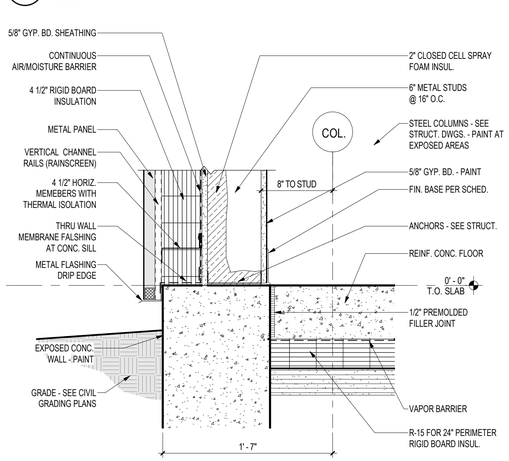
7 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



4 WALL SECTION DETAIL

Scale: 1 1/2" = 1'-0"



1 WALL SECTION DETAIL - BASE

Scale: 1 1/2" = 1'-0"

11/11/2024 2:28:24 PM

TCA
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
NO. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23

Drawn: FEA Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

EXTERIOR DETAILS

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
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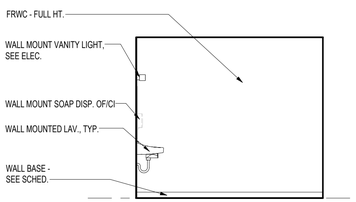
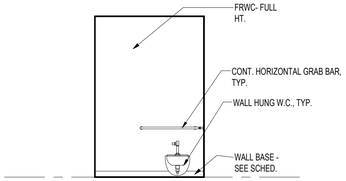
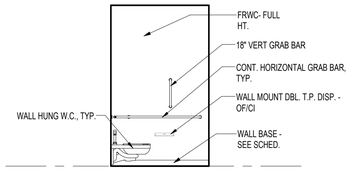
Sheet A3.44



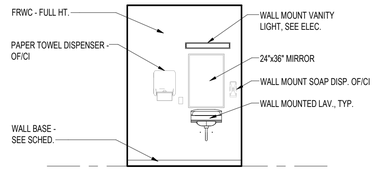
20 126T BAY TOILET - SOUTH
Scale: 1/4" = 1'-0"



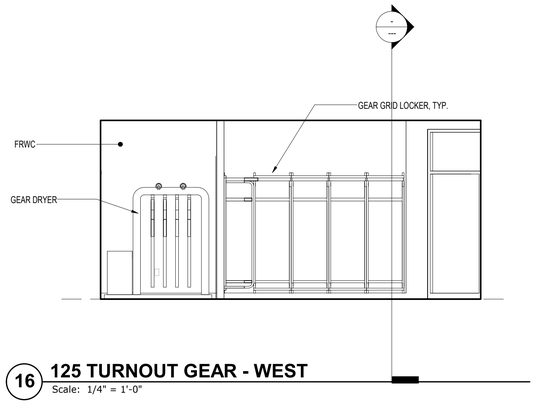
19 126T BAY TOILET - NORTHWEST
Scale: 1/4" = 1'-0"



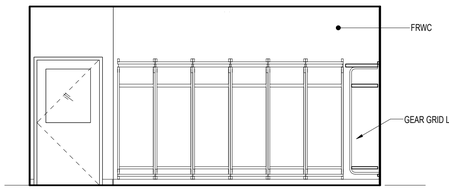
18 126T BAY TOILET - NORTHEAST
Scale: 1/4" = 1'-0"



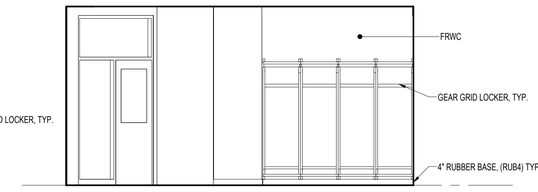
17 126T BAY TOILET - EAST
Scale: 1/4" = 1'-0"



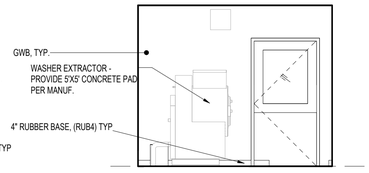
16 125 TURNOUT GEAR - WEST
Scale: 1/4" = 1'-0"



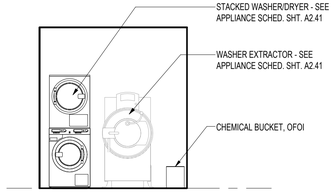
15 125 TURNOUT GEAR - SOUTH
Scale: 1/4" = 1'-0"



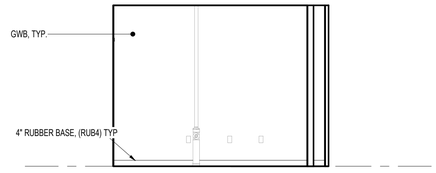
14 125 TURNOUT GEAR - NORTH
Scale: 1/4" = 1'-0"



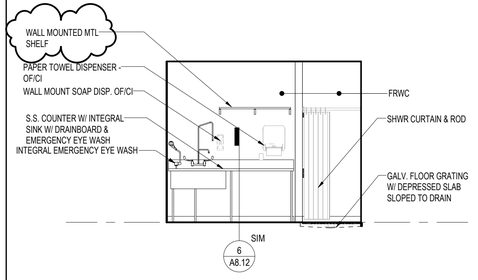
13 124 CLEANING - WEST
Scale: 1/4" = 1'-0"



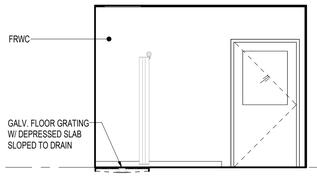
12 124 CLEANING - SOUTH
Scale: 1/4" = 1'-0"



11 124 CLEANING - EAST
Scale: 1/4" = 1'-0"



10 123 DECON - NORTH
Scale: 1/4" = 1'-0"



9 123 DECON - EAST
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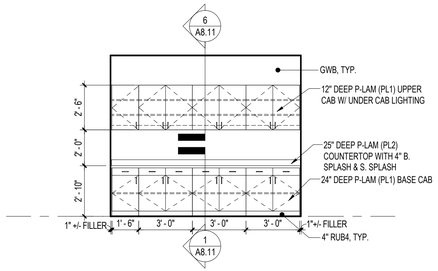
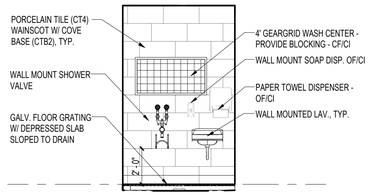
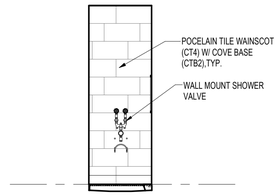


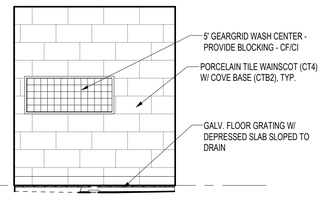
8 122 EMS - SOUTH
Scale: 1/4" = 1'-0"



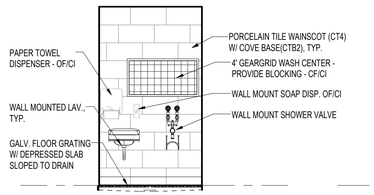
7 116A ALCOVE - NORTH
Scale: 1/4" = 1'-0"



6 116B WASH ALCOVE - SOUTH
Scale: 1/4" = 1'-0"



5 116B WASH ALCOVE - WEST
Scale: 1/4" = 1'-0"



4 116C ALCOVE - SOUTHEAST
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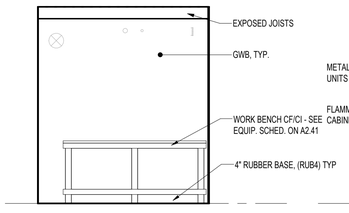
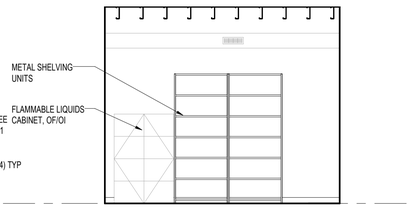
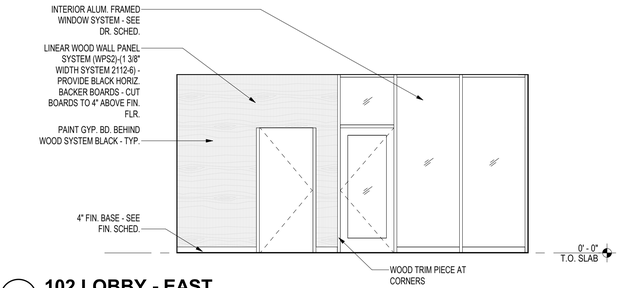


3 119 SHOP - NORTH
Scale: 1/4" = 1'-0"



2 119 SHOP - WEST
Scale: 1/4" = 1'-0"



1 102 LOBBY - EAST
Scale: 1/4" = 1'-0"

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GENERAL NOTES

1. PROVIDE FULL HEIGHT BACKER BD. WALLS & CLG. OF SHOWER ENCLOSURES AND MOP SINKS, TYP.
2. PROVIDE WATER RESISTANT GWB AT ALL WET WALLS
3. PROVIDE 2X BLOCKING FOR WALL MOUNTED MARKER/ TACK BOARDS, TV'S, EQUIP., FURNISHINGS, ACCESSORIES, CABINETS, DOOR STOPS, BRACING, PLUMING FIXTURES, ETC - INCLUDING BLOCKING FOR ITEMS FURNISH BY OWNER. CONTRACTOR TO COORDINATE LOCATIONS W/ OWNER DURING ROUGH FRAMING.
4. REFER TO SHEET G0.04 FOR WALL TYPES AND FINISHES.
5. ADA RESTROOMS, FIXTURE MOUNTING HEIGHTS AND CLEARANCE REQUIREMENTS SHALL COMPLY WITH ICC A117.1 CHAPTER 6.
6. ELECTRICAL AND MECHANICAL UNITS ARE SHOWN FOR REFERENCE ONLY.
7. REFER TO A5.11 FOR RESTROOM FIXTURE AND ACCESSORY DIMENSIONS NOT SHOWN.
8. SEE APPLIANCE & EQUIPMENT SCHEDULES ON SHEET A2.41 FOR ALL APPLIANCES AND EQUIPMENT.

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23
Design Development	05/26/23

Drawn TCA/A3C Checked TCA/A3C

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

INTERIOR ELEVATIONS

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
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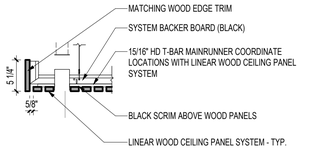
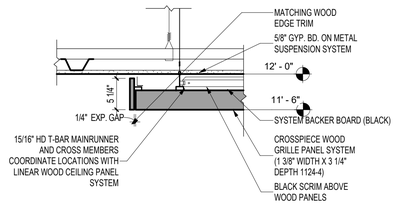
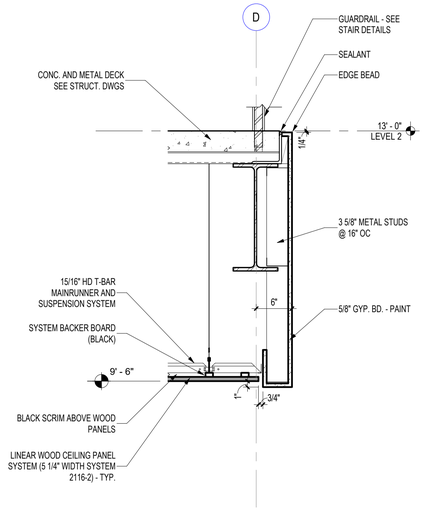
Sheet A4.13



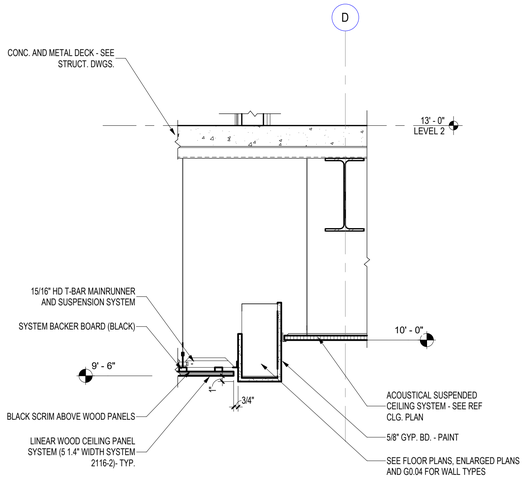
11 CEILING DETAIL
Scale: 1" = 1'-0"



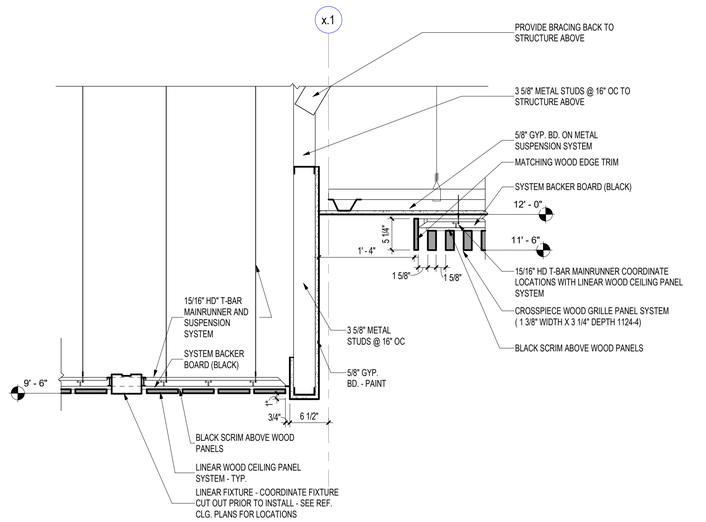
10 CEILING DETAIL
Scale: 1" = 1'-0"



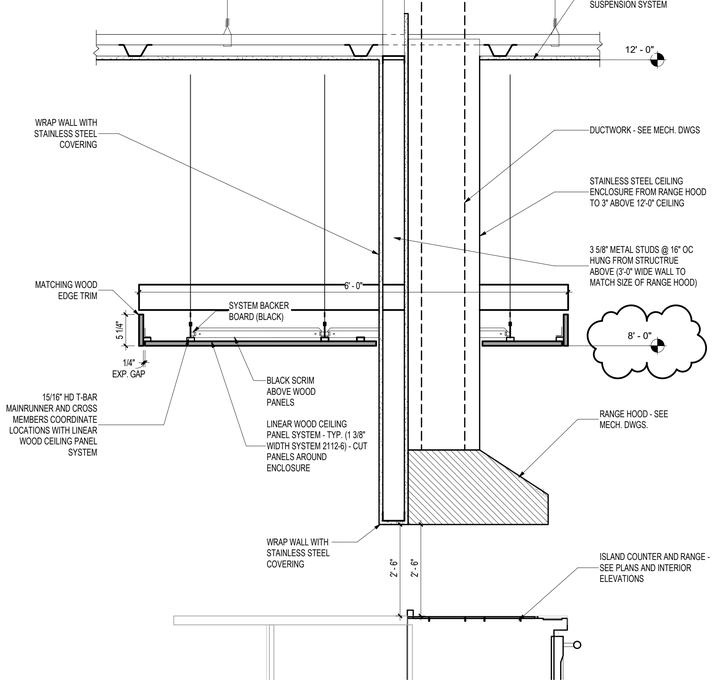
9 CEILING DETAIL
Scale: 1" = 1'-0"



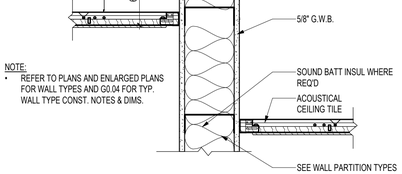
8 CEILING DETAIL
Scale: 1" = 1'-0"



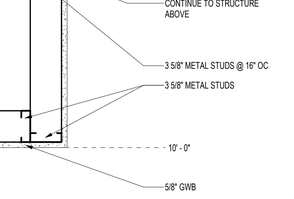
7 CEILING DETAIL
Scale: 1" = 1'-0"



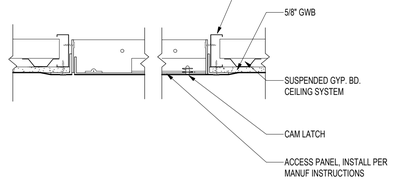
3 CEILING DETAIL
Scale: 1" = 1'-0"



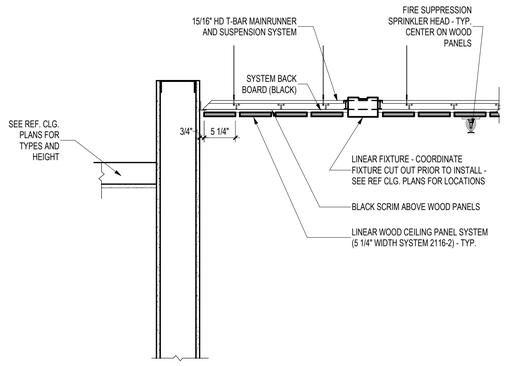
6 CEILING DETAIL
Scale: 1 1/2" = 1'-0"



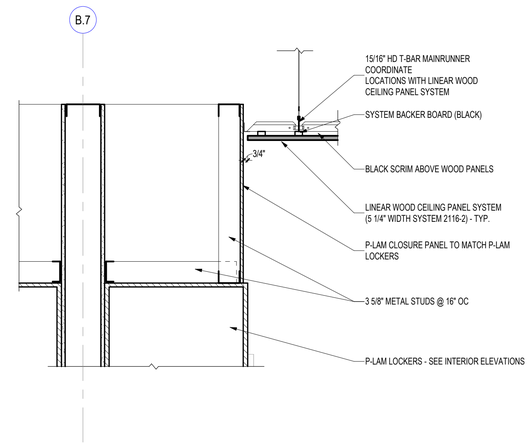
5 CEILING SOFFIT DETAIL
Scale: 1 1/2" = 1'-0"



4 CEILING DETAIL ACCESS PANEL
Scale: 1 1/2" = 1'-0"



2 CEILING DETAIL
Scale: 1" = 1'-0"



1 CEIILNG DETAIL
Scale: 1" = 1'-0"

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TCA
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23

Drawn: KJ Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

CEILING DETAILS

A3C COLLABORATIVE ARCHITECTURE
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T: (734) 663 - 1910
F: (866) 732 - 2168
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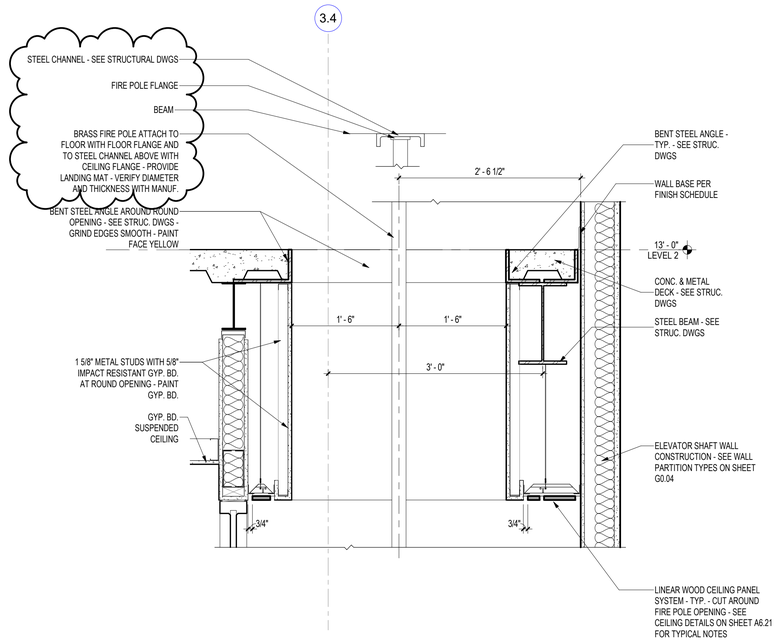
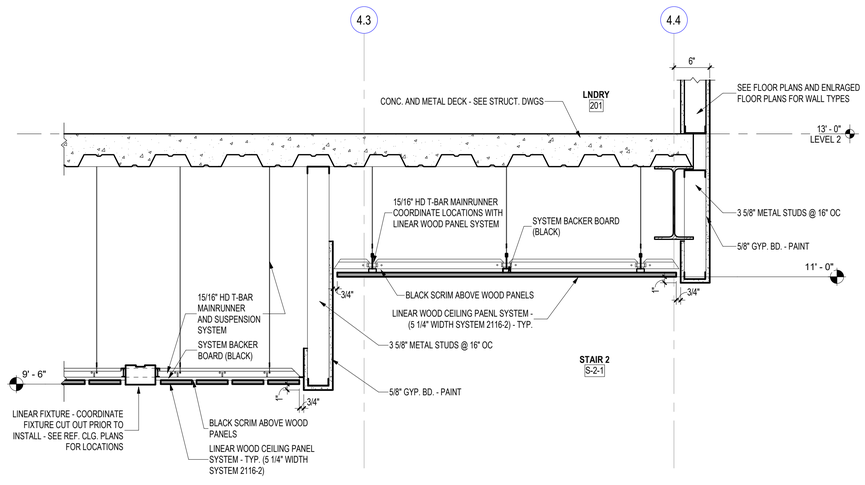
Sheet A6.21



2 FIRE POLE DETAIL

Scale: 1" = 1'-0"



1 CEILING DETAIL

Scale: 1" = 1'-0"

11/1/2024 2:31:13 PM

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ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

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Bids/Permits	08/04/23

Drawn: FEA/KJ Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
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CEILING DETAILS

A 3 C
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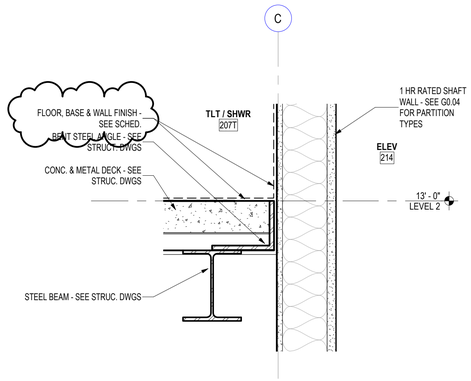
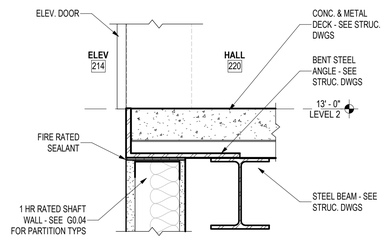
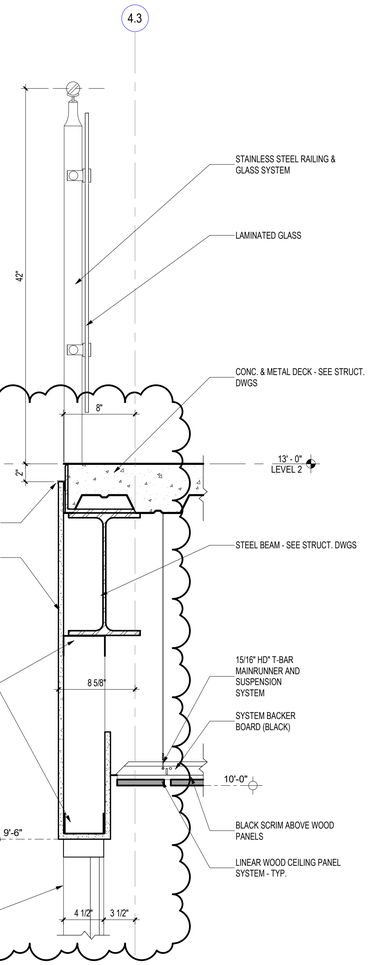
Sheet A6.22



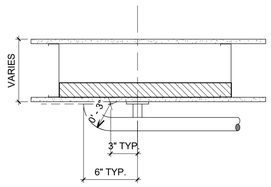
5 DETAIL
Scale: 1 1/2" = 1'-0"



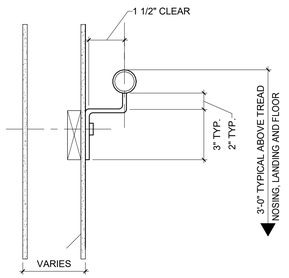
4 DETAIL
Scale: 1 1/2" = 1'-0"



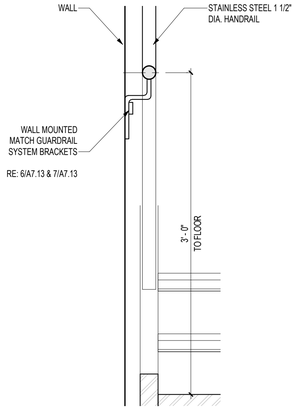
1 DETAIL
Scale: 1 1/2" = 1'-0"



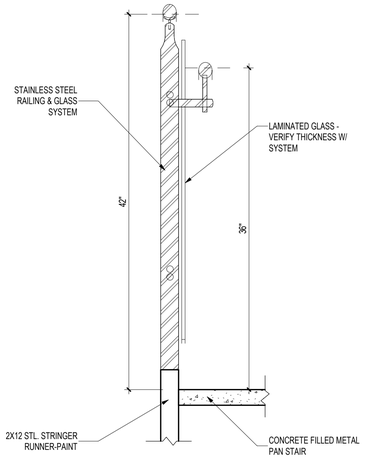
7 HANDRAIL MOUNTING - 2
Scale: 1 1/2" = 1'-0"



6 HANDRAIL MOUNTING - 1
Scale: 1 1/2" = 1'-0"



3 HANDRAIL DETAIL - WALL
Scale: 1 1/2" = 1'-0"



2 TYP. GUARDRAIL & HANDRAIL DETAIL
Scale: 1 1/2" = 1'-0"

11/11/2024 2:34:23 PM

T C A
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23

Drawn: KJ Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

STAIR & ELEVATOR DETAILS

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
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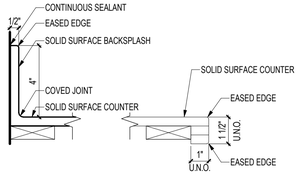
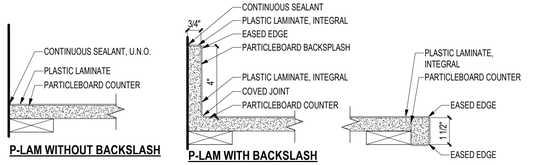
Sheet A7.13

MILLWORK HARDWARE SPECIFICATIONS:

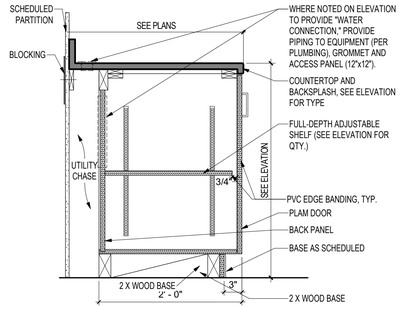
SHORT DESCRIPTION	BRAND	MODEL	FINISH	COMMENT(S):
STANDARD DOOR HINGE	SALICE	SH-C1P6DD9	NICKEL PLATED	SOFT CLOSE
LAZY SUSAN HINGE	SALICE	SH-C2PYA	NICKEL PLATED	SOFT CLOSE
LAZY SUSAN CENTER HINGE	SALICE	SH-C2PFA	NICKEL PLATED	SOFT CLOSE
LAZY SUSAN SHELF	OMEGA NATIONAL PRODUCTS	NA-T8228K30TRDCBMNL1	MATCH P-LAM	LAZY SUSAN KIDNEY SHAPED INSERT, WITH ATTACHED CAST BEARINGS
DRAWER SLIDES	SALICE	SAA7555	ZINC	ZINC, SOFT CLOSE, ADJUSTABLE LOCKING
HANDLE	BERENSON	9401-2BPN-P	BRUSHED NICKEL	
COUNTER MOUNT	RAKKS	EHCS-24 / EH-1824	PAINTED	



16 TYPICAL SLDS DETAIL
Scale: 3" = 1'-0"



15 TYPICAL P-LAM DETAIL
Scale: 3" = 1'-0"



14 CASEWORK DETAIL
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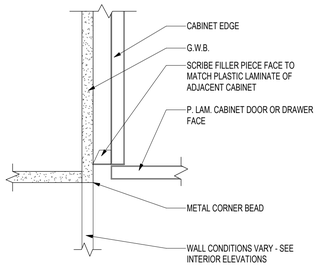
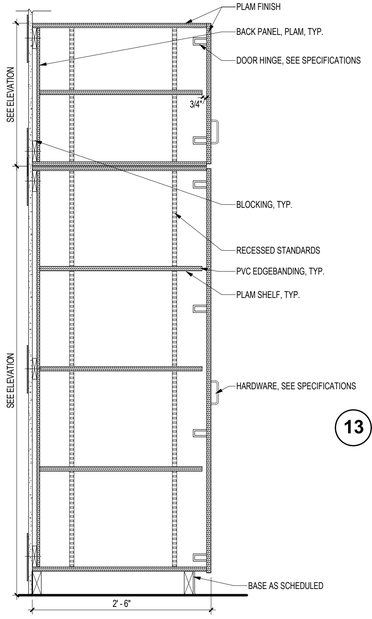
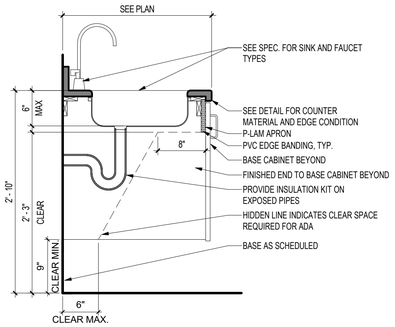


17 CABINET SCRIBE
Scale: 3" = 1'-0"





13 CASEWORK DETAIL
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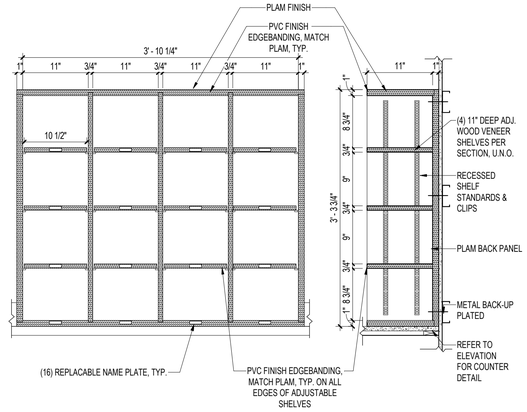
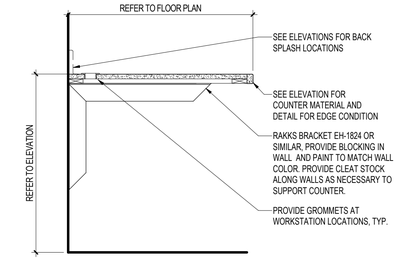


12 CASEWORK DETAIL
Scale: 1" = 1'-0"



11 CASEWORK DETAIL
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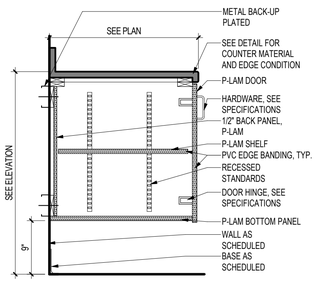

10 CASEWORK DETAIL
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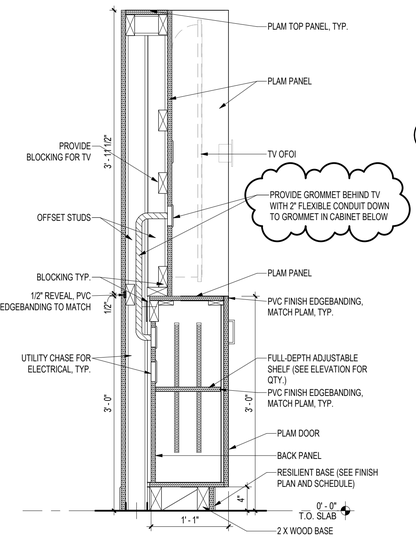
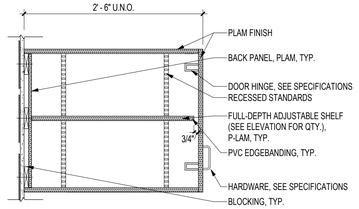
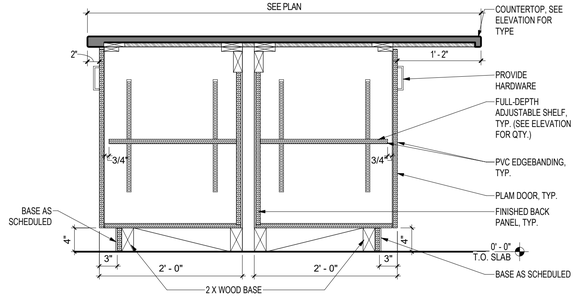


9 CASEWORK DETAIL
Scale: 1" = 1'-0"



8 CASEWORK DETAIL
Scale: 1" = 1'-0"



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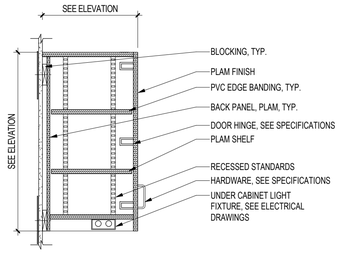

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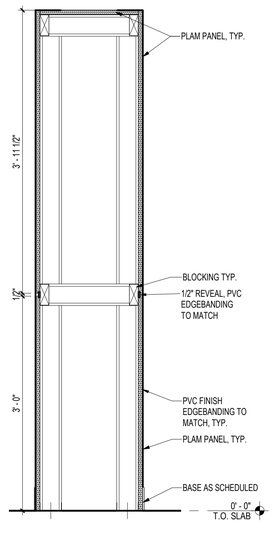

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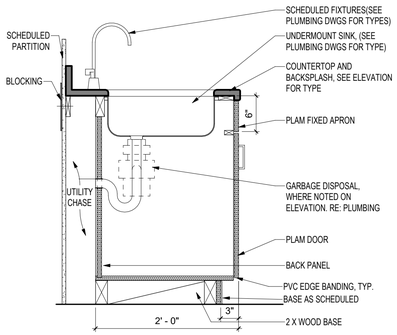

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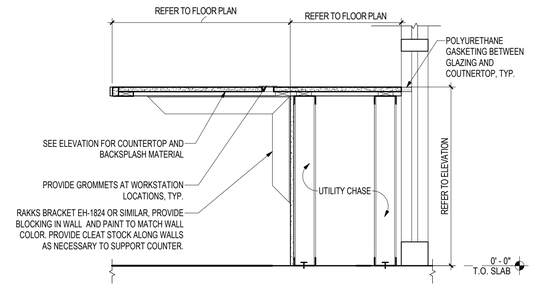

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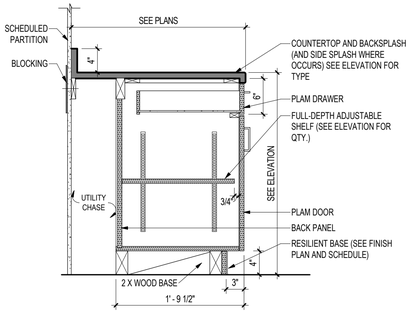

1 CASEWORK DETAIL
Scale: 1" = 1'-0"

11/1/2024 2:34:50 PM

T C A
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STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

A 3 C
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
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COLLABORATIVE ARCHITECTURE

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
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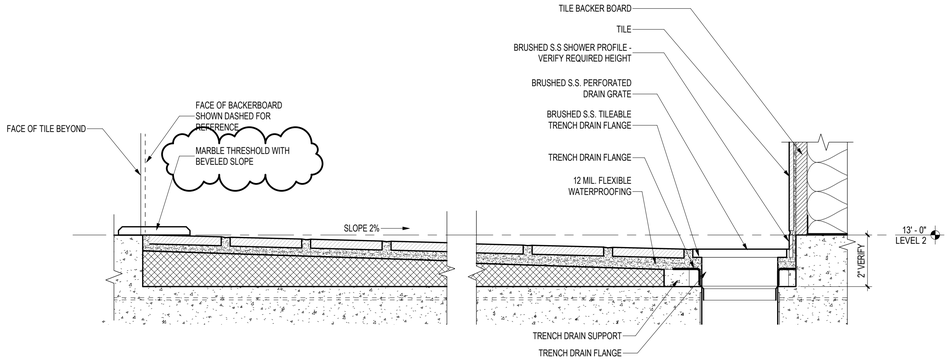
Drawn: SAD Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

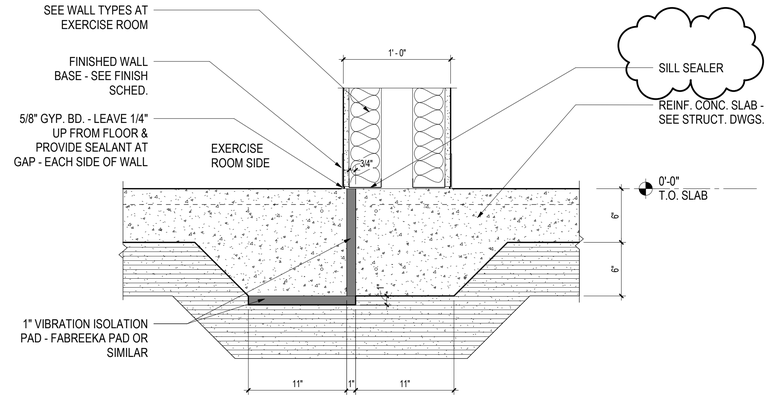
CASEWORK DETAILS

Sheet A8.11



10 SHOWER ENCLOSURE SECTION

Scale: 3" = 1'-0"



9 ISOLATION JOINT

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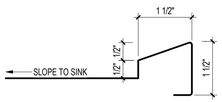
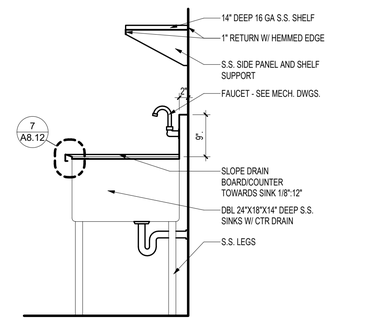


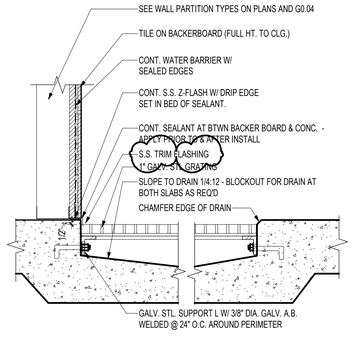
7 DECON SINK LIP PROFILE

Scale: 6" = 1'-0"



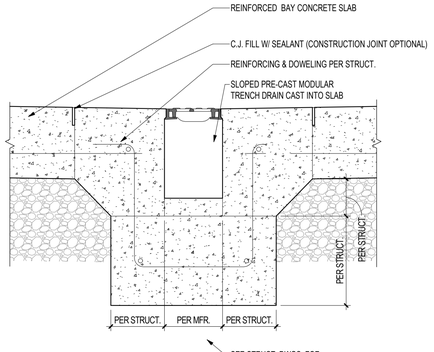
6 DECON SINK

Scale: 3/4" = 1'-0"



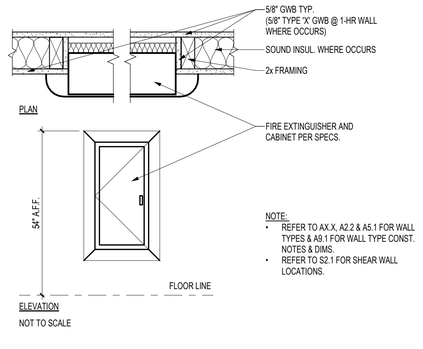
5 WASHOFF SINK SECTION

Scale: 1 1/2" = 1'-0"



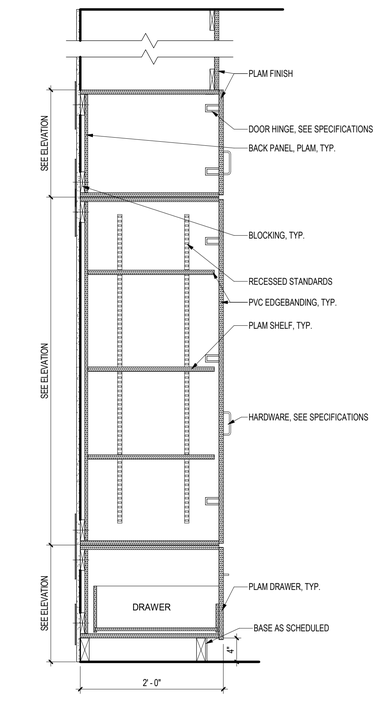
4 TRENCH DRAIN

Scale: 1 1/2" = 1'-0"



3 FIRE EXTINGUISHER CABINET

Scale: 1 1/2" = 1'-0"



2 CASEWORK DETAIL

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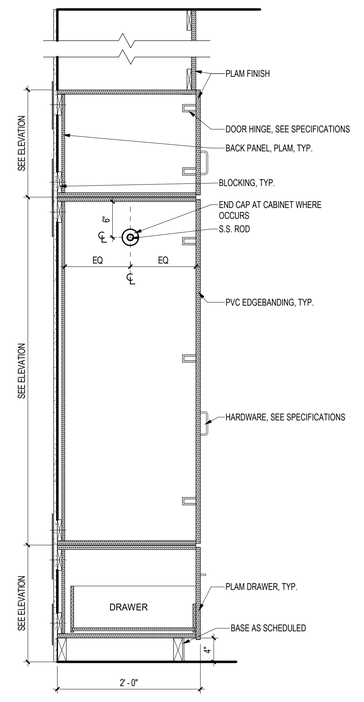

1 CASEWORK DETAIL

Scale: 1" = 1'-0"

11/11/2024 2:35:02 PM

TCA
ARCHITECTURE + PLANNING + DESIGN

STATE OF MICHIGAN
DONALD F. BARRY
ARCHITECT
No. 1301042291
LICENSED ARCHITECT

Project Number 21018

Issue	Date
Revision 1	Date 1
Addendum #1	11/11/24
Bids/Permits	10/11/24
Bids/Permits	08/04/23

Drawn: KJ/FEA Checked: FEA

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

INTERIOR FINISH DETAILS

A3C COLLABORATIVE ARCHITECTURE
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ANN ARBOR, MI 48104
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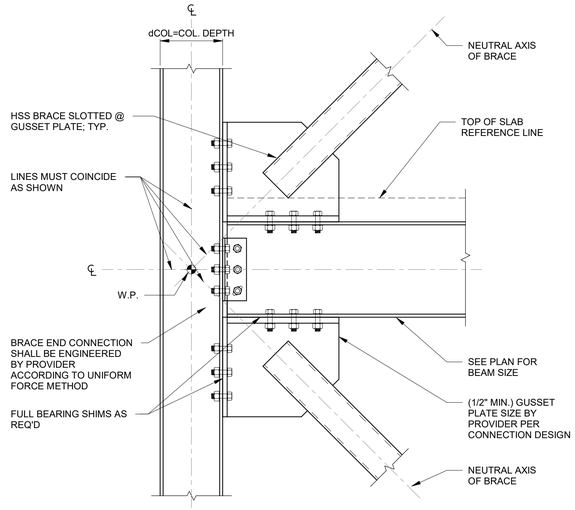
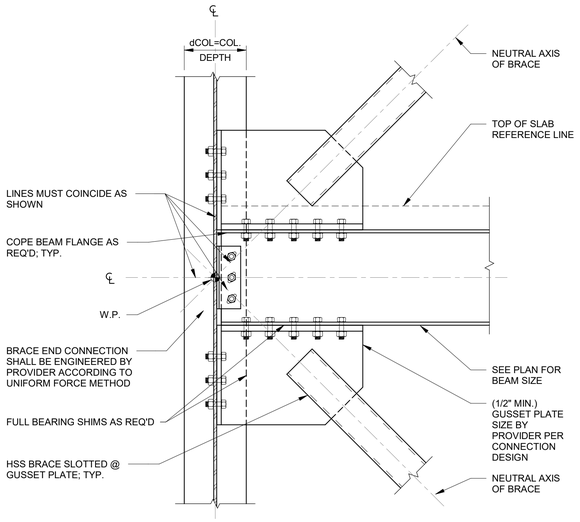
Sheet A8.12



NOTE: CONNECTION DETAILS SHOWN ABOVE ARE SCHEMATIC DETAILS ONLY. CONTRACTOR SHALL DETAIL BRACE CONNECTIONS BASED ON AXIAL LOADS INDICATED IN LATERAL FRAME ELEVATIONS AND SHALL PROVIDE SIGNED AND SEALED CALCULATIONS PRIOR TO SUBMISSION OF SHOP DRAWINGS.

TYPICAL HSS LATERAL BRACE CONNECTION AT COLUMN FLANGE

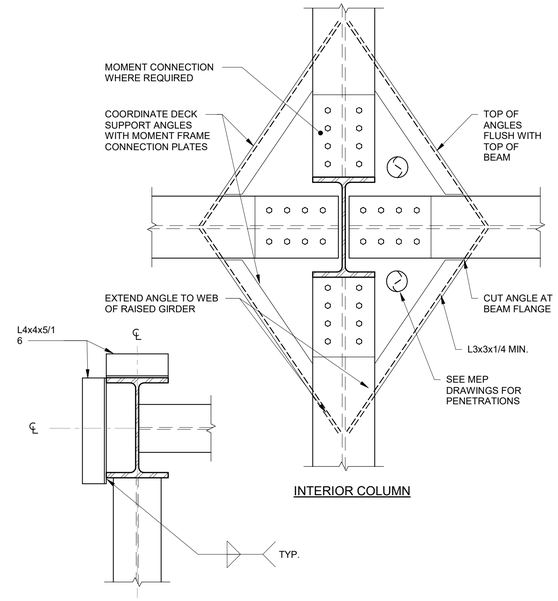
N.T.S.



NOTE: CONNECTION DETAILS SHOWN ABOVE ARE SCHEMATIC DETAILS ONLY. CONTRACTOR SHALL DETAIL BRACE CONNECTIONS BASED ON AXIAL LOADS INDICATED IN LATERAL FRAME ELEVATIONS AND SHALL PROVIDE SIGNED AND SEALED CALCULATIONS PRIOR TO SUBMISSION OF SHOP DRAWINGS.

TYPICAL HSS LATERAL BRACE CONNECTION AT COLUMN WEB

N.T.S.

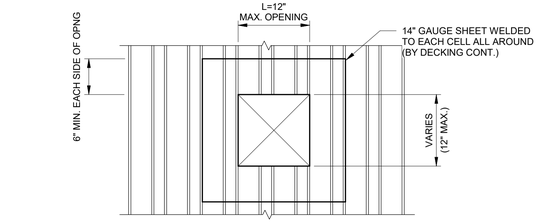


INTERIOR COLUMN

CORNER COLUMN

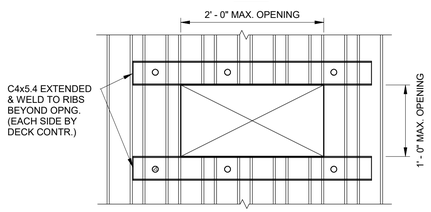
TYPICAL DECK SUPPORT AT COLUMNS (SMALL MEP PENETRATIONS)

N.T.S.



NO REINF. REQUIRED WHERE "L" IS 6" OR LESS IN DIRECTION PERPENDICULAR TO DECK.

FOR OPENINGS UP TO 12" PERPENDICULAR TO DECK



NO REINF. REQUIRED FOR HOLES 6" Ø OR LESS.

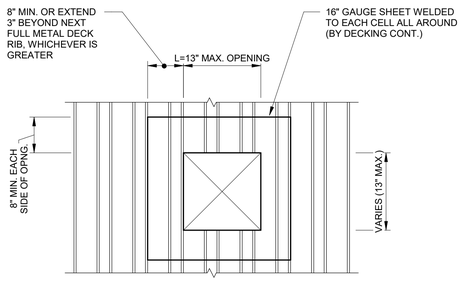
FOR OPENINGS UP TO 2'-0" PERPENDICULAR TO DECK

NOTES:

1. SEE MECHANICAL AND ARCHITECTURAL DRAWINGS FOR OPENING SIZE AND LOCATION.
2. WHERE POSSIBLE; EXTEND DECK CONTINUOUSLY OVER OPENING REINFORCE, BLOCK/BOX OUT CONCRETE, AND CUT DECK WHEN OPENING IS REQUIRED.

TYPICAL REINFORCEMENT FOR UNFRAMED OPENINGS IN COMPOSITE FLOOR DECK

N.T.S.



NO REINF. REQUIRED WHERE "L" IS 2" OR LESS IN DIRECTION PERPENDICULAR TO DECK.

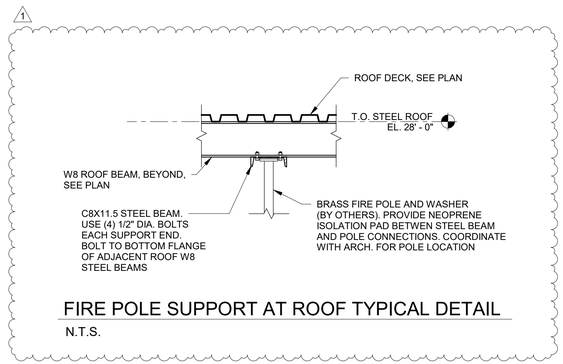
FOR OPENINGS UP TO 13" PERPENDICULAR TO DECK

NOTES:

1. SEE MECHANICAL AND ARCHITECTURAL DRAWINGS FOR OPENING SIZE AND LOCATION.
2. WHERE POSSIBLE; EXTEND DECK CONTINUOUSLY OVER OPENING, REINFORCE AND CUT DECK WHEN OPENING IS REQUIRED.

TYPICAL REINFORCEMENT FOR UNFRAMED OPENINGS IN ROOF DECK

N.T.S.



FIRE POLE SUPPORT AT ROOF TYPICAL DETAIL

N.T.S.

11/11/2024 10:32:20 AM

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ARCHITECTURE + PLANNING + DESIGN

Silman

STATE OF MICHIGAN
NATHANIEL ELRA OPPENHEIMER
ENGINEER
No. 6201052117
LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMIT	08/04/23
BIDS/PERMIT	10/11/24
ADDENDUM #1	11/11/24

Drawn: AD Checked: RH

City of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

TYPICAL DETAILS

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Sheet S5.04

SILMAN PROJECT # 20145

MECHANICAL ABBREVIATION LIST

ABBREVIATION	DESCRIPTION
A	COMPRESSED AIR
A(___#)	COMPRESSED AIR (SPECIFIC PSIG)
AAV	AUTOMATIC AIR VENT
ACC	AIR COOLED CONDENSER
ACCU	AIR COOLED CONDENSER UNIT
AD	ACCESS DOOR
AD	AREA DRAIN
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
AHR	AIR HANDLING UNIT
AHU	ALTERNATE
ALT	AMPERE
AMP	AIR PRESSURE DROP
APD	ARGON
AR	AMERICAN SOCIETY OF HEATING, REFRIGERATION
ASHRAE	AND AIR-CONDITIONING ENGINEERS
	AUTOMATIC SPRINKLER RISER
ASR	AIR TRANSFER DUCT
ATD	AUXILIARY
AUX	ACID VENT
AV	ACID VENT THROUGH ROOF
AVTR	ACID WASTE
AW	
	BUILDING AUTOMATION SYSTEM
BAS	BLOWER COIL UNIT
BCU	BACK DRAFT DAMPER
BDD	BELOW FINISHED FLOOR
BFF	BACKFLOW PREVENTER
BFP	BRAKE HORSEPOWER
BHP	BOTTOM OF DUCT
BOD	BOTTOM OF PIPE
BOP	BRITISH THERMAL UNIT
BTU	BRITISH THERMAL UNIT PER HOUR
BTUH	BEVERAGE CONDUIT
BVC	BACKWATER VALVE
BWV	
	COMMON
C	CAPACITY
CAP	CONSTANT AIR VOLUME
CAHR	COMPRESSED AIR HOSE REEL
CAV	CATCH BASIN
CB	COOLING COIL
CC	COLD DECK
CD	CONDENSATE DRAIN
CD	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
CFCI	CUBIC FEET PER HOUR
CFH	CUBIC FEET PER MINUTE
CFM	CHILLER
CH	CHILLED WATER
CHW	CHILLED WATER RETURN
CHWR	CHILLED WATER SUPPLY
CHWS	COOLING
CLG	CONDENSATE
CNDS	CONDENSATE (SPECIFIC PSIG)
CNDS (__#)	CLEAN OUT
CO	CARBON DIOXIDE
CO2	CONTINUATION OR CONTINUED
CONT	CONTRACTOR
CONTR	CONVECTOR
CONV	COEFFICIENT OF PERFORMANCE
COP	CLEAN OUT TO GRADE
COTG	CIRCULATING PUMP
CP	CONDENSATE RETURN UNIT
CRU	CLINICAL SERVICE SINK
CSS	COOLING TOWER
CT	CABINET UNIT HEATER
CUH	DOMESTIC COLD WATER
CW	DOMESTIC COLD WATER - FILTERED
CWF	CONDENSER WATER RETURN
CWR	CONDENSER WATER SUPPLY
CWS	
	DRIP AND TRAP
D&T	DISCHARGE AIR
DA	DISCHARGE AIR TEMPERATURE
DAT	DRY BULB
DB	DIRECT DIGITAL CONTROL
DDC	DEGREE
DEG	DRAINAGE FIXTURE UNITS
DFU	DIAMETER
DIA	DAMPER
DMPR	DAY/NIGHT
D/N	DOWN
DN	DOWNSPOUT NOZZLE
DNZ	DUCT SILENCER
DS	DRAIN TILE
DT	DRAIN TILE CONNECTION
DTC	DOMESTIC WATER HEATER
DWH	DRAWING
DWG	
	EXISTING
(E)	EXHAUST GRILLE OR REGISTER
E	EACH
EA	EXHAUST AIR
EA	ENTERING AIR TEMPERATURE
EAT	EXPANSION COMPENSATOR
EC	ELECTRIC CABINET UNIT HEATER
ECUH	ENTERING DRY BULB
EDB	ENERGY EFFICIENCY RATIO
EER	EMERGENCY EYE WASH / SHOWER
EES	EMERGENCY EYE WASH
EEW	EXHAUST FAN
EF	EFFICIENCY
EFF	ELECTRIC HEATING COIL
EHC	EXPANSION JOINT
EJ	ELEVATION
EL	ELECTRICAL
ELEC	ENERGY MANAGEMENT SYSTEM
EMS	ENERGY RECOVERY LOOP
ERL	ENERGY RECOVERY LOOP RETURN
ERLR	ENERGY RECOVERY LOOP SUPPLY
ERLS	ENERGY RECOVERY UNIT
ERU	EMERGENCY SHOWER
ESH	EXTERNAL STATIC PRESSURE
ESP	ELECTRIC UNIT HEATER
EUH	ENTERING WET BULB
EWB	ELECTRIC WATER COOLER
EWC	ENTERING WATER TEMPERATURE
EWT	EXHAUST
EXH	
	FIRE PROTECTION
F	DEGREES FAHRENHEIT
°F	FACE AND BYPASS
F&B	FLOAT AND THERMOSTATIC
F&T	FACE AREA
FA	FAN COIL UNIT
FCU	

ABBREVIATION	DESCRIPTION
FD	FLOOR DRAIN
FFD	FUNNEL FLOOR DRAIN
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHV	FIRE HOSE VALVE
FLA	FULL LOAD AMPS
FLR	FLOOR
FM	FLOW METER
FMS	FLOW MEASURING STATION
FPM	FEET PER MINUTE
FP	FIRE PUMP
FPTU	FAN POWERED (AIR) TERMINAL UNIT
FS	FLOOR SINK
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FT	FEET
FTR	FINNED TUBE RADIATION
FV	FACE VELOCITY
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GRH	GRAVITY RELIEF HOOD
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSAN	GREASE SANITARY WASTE
H	HYDROGEN
HB	HOSE BIBB
HC	HEATING COIL
HD	HOT DECK
HEPA	HIGH EFFICIENCY PARTICULATE ARRESTANCE
HL	HIGH LIMIT
HOA	HAND/OFF/AUTO
HP	HEAT PUMP
HP	HORSEPOWER
HPCW	HIGH PRESSURE DOMESTIC COLD WATER
HPHW	HIGH PRESSURE DOMESTIC HOT WATER
HPHWR	HIGH PRESSURE DOMESTIC HOT WATER RETURN
HPL	HEAT PUMP LOOP
HPLR	HEAT PUMP LOOP RETURN
HPLS	HEAT PUMP LOOP SUPPLY
HR	HOUR
HS	HOSE STATION
HTG	HEATING
HV	HEATING VENTILATING
HVAC	HEATING, VENTILATING, AIR CONDITIONING
HWH	HOT WATER HEATING
HWHR	HOT WATER HEATING RETURN
HWHS	HOT WATER HEATING SUPPLY
HW	DOMESTIC HOT WATER
HW(__)	DOMESTIC HOT WATER (SPECIFIC TEMP °F)
HWR	DOMESTIC HOT WATER RETURN
HX	HEAT EXCHANGER
HZ	HERTZ
IAQ	INDOOR AIR QUALITY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IH	INTAKE HOOD
IN	INCHES
IR	INFRARED HEATER
IW	INDIRECT WASTE
JC	JANITOR'S CLOSET
JP	JOCKEY PUMP
KA	THOUSAND AMP
KW	KILOWATT
KWH	KILOWATT-HOUR
LAT	LEAVING AIR TEMPERATURE
LAB	LABORATORY
LAV	LAVATORY
LBS	POUNDS
LDB	LEAVING DRY BULB
LL	LOW LIMIT
LPC	LOW PRESSURE CONDENSATE
LPG	LIQUIFIED PETROLEUM GAS (PROPANE)
LPS	LOW PRESSURE STEAM
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
MCA	MEDICAL COMPRESSED AIR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MIL	1/1000th INCH
MIN	MINIMUM
MISC	MISCELLANEOUS
MMBH	MILLION BRITISH THERMAL UNITS PER HOUR
MOP	MAXIMUM OVERCURRENT PROTECTION
M/S	MOTOR STARTER
MTD	MOUNTED
MTR	MOTOR
MV	MANUAL AIR VENT
MVAC	MEDICAL VACUUM
N	NITROGEN
N2O	NITROUS OXIDE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NCTC	NORMALLY CLOSED TIMED CLOSED
NCTO	NORMALLY CLOSED TIMED OPEN
NFPA	NATIONAL FIRE PROTECTION AGENCY
NOTC	NORMALLY OPEN TIMED CLOSED
NOTO	NORMALLY OPEN TIMED OPEN
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NPCW	NON POTABLE COLD WATER

ABBREVIATION	DESCRIPTION
O	OXYGEN
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OB	OUTLET BOX
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER/CENTER TO CENTER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OL	OVERLOAD
ORC	OVERFLOW RAIN CONDUCTOR
ORD	OVERFLOW ROOF DRAIN
OSAN	OIL SANITARY WASTE
OS&Y	OUTSIDE SCREW AND YOKE
OV	OUTLET VELOCITY
OWS	OPERATOR WORKSTATION
PACU	PACKAGED AIR CONDITIONING UNIT
PBD	PARALLEL BLADE DAMPER
PC	PUMPED CONDENSATE
PCW	PROCESS COOLING WATER
PCWR	PROCESS COOLING WATER RETURN
PCWS	PROCESS COOLING WATER SUPPLY
PD	PRESSURE DROP (FEET OF WATER)
PH	PERIMETER HEAT
PHR	PERIMETER HEAT RETURN
PHS	PERIMETER HEAT SUPPLY
PNL	PANEL
PPM	PARTS PER MILLION
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSAN	PUMPED SANITARY
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH - ABSOLUTE
PSIG	POUNDS PER SQUARE INCH - GAUGE
PST	PUMPED STORM
PW	PURIFIED WATER
PWR	PURIFIED WATER RETURN
PWS	PURIFIED WATER SUPPLY
(R)	RELOCATED
R	RETURN GRILLE OR REGISTER
RA	RETURN AIR
RAT	RETURN AIR TEMPERATURE
RC	RAIN CONDUCTOR
RCP	RADIANT CEILING PANEL
RD	ROOF DRAIN
REQD	REQUIRED
REF	ROOF EXHAUST FAN
RF	RETURN FAN
RFH	ROOF HYDRANT
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RLFA	RELIEF AIR
RPM	REVOLUTIONS PER MINUTE
RPDA	REDUCED PRESSURE BACKFLOW
	DETECTION ASSY
RPZA	REDUCED PRESSURE BACKFLOW
	ZONE ASSY
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
S	SUPPLY AIR DIFFUSER OR GRILLE
SA	SOUND ATTENUATOR
SA	SUPPLY AIR
SAN	SANITARY WASTE
SAT	SUPPLY AIR TEMPERATURE
SCCR	SHORT CIRCUIT CURRENT RATING
SECT	SECTION
SF	SUPPLY FAN
SH	SHOWER
SK	SINK
SMR	SNOW MELT RETURN
SMS	SNOW MELT SUPPLY
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SPKLR	SPRINKLER
SQFT	SQUARE FOOT/SQUARE FEET
S/S	START/STOP
SS	SERVICE SINK
ST	STORM
STD	STANDARD
STK	STACK
STM	STEAM
STM(__#)	STEAM (SPECIFIC PSIG)
S/W	SUMMER/WINTER
SW	SWITCH
T	TRANSFER GRILLE
TC	TEMPERATURE CONTROL
TC	TEMPERING COIL
TCP	TEMPERATURE CONTROL PANEL
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TEMP	TEMPORARY
TH	TERMINAL HEATING
THA	TOTAL HEAT ABSORBED
THR	TERMINAL HEATING RETURN
THR	TOTAL HEAT REJECTED
THS	TERMINAL HEATING SUPPLY
TMR	TIMER SWITCH
TPD	TEPID WATER
TSP	TOTAL STATIC PRESSURE
TU	(AIR) TERMINAL UNIT
TV	TURNING VANES
TW	TEMPERED WATER
TYP	TYPICAL
UH	UNIT HEATER
UL	UNDERWRITER'S LABORATORY
UON	UNLESS OTHERWISE NOTED
UR	URINAL
UV	UNIT VENTILATOR
V	VALVE
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VACUUM BREAKER
VD	VOLUME DAMPER (MANUALLY ADJUSTABLE)
VOL	VOLUME
VFC	VARIABLE FREQUENCY CONTROLLER
VTR	VENT THROUGH ROOF
VTU	VENTURI TERMINAL UNIT
VUV	VERTICAL UNIT VENTILATOR
W	WASTE
W&V	WASTE AND VENT
WAGD	WASTE ANESTHETIC GAS DISPOSAL
WB	WET BULB
WC	WATER CLOSET
WC	WATER COLUMN
WG	WATER GAUGE
WH	WALL HYDRANT
WMSD	WASHING MACHINE
	SUPPLY AND DRAIN BOX
WPD	WATER PRESSURE DROP
WT	WEIGHT
XFMR	TRANSFORMER
ZVB	ZONE VALVE BOX

TEMPERATURE CONTROL - PARTIAL SYMBOLS LIST

SYMBOL	DESCRIPTION
CO2	CARBON DIOXIDE SENSOR
CO	CARBON MONOXIDE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FM	FLOW METER
	GUARD FOR STAT OR SENSOR
H	HUMIDISTAT OR HUMIDITY SENSOR (AS DEFINED ON TC DRAWINGS)

SYMBOL	DESCRIPTION
OS	OCCUPANCY SENSOR
PT	PRESSURE TRANSMITTER
SP	STATIC PRESSURE SENSOR OR PROBE
	VALVE - 2 WAY CONTROL VALVE
	VALVE - 3 WAY CONTROL VALVE
T	THERMOSTAT OR TEMPERATURE SENSOR (AS DEFINED ON TC DRAWINGS)

NOTE: LIST OF ADDITIONAL SYMBOLS & ABBREVIATIONS ASSOCIATED WITH TEMPERATURE CONTROLS ARE IDENTIFIED ON TC DRAWINGS.

MECHANICAL SYMBOL LIST

PIPING SYMBOLS

SYMBOL	DESCRIPTION
AV	AIR VENT - AUTOMATIC
MV	AIR VENT - MANUAL
BFP	BACKFLOW PREVENTER
	CATCH BASIN
	CIRCULATING PUMP
CO	CLEAN OUT - IN FLOOR
CO	CLEAN OUT - FLANGE
	DIRECTION OF FLOW
	DIRECTION OF PITCH - DOWN
	FINNED TUBE RADIATION
	FIRE PROTECTION - SIAMESE CONNECTION - FREE STANDING
	FIRE PROTECTION - SIAMESE CONNECTION - WALL MOUNTED
	FIRE PROTECTION - SPRINKLER HEAD, CONCEALED
	FIRE PROTECTION - SPRINKLER HEAD, PENDANT
	FIRE PROTECTION - SPRINKLER HEAD, UPRIGHT
	FIRE PROTECTION - SPRINKLER HEAD, SIDEWALL
	FLOOR DRAIN
	FLOOR DRAIN - ELEVATION
	FLOOR DRAIN - FUNNEL
	FLOOR DRAIN - FUNNEL, ELEVATION
	FLOW MEASURING DEVICE (FOR TEST AND BALANCING)
FS	FLOW SWITCH
FM	FLOW METER
HB	HOSE BIBB
MH	MANHOLE
	OPEN SITE DRAIN
	PIPE - ANCHOR
	PIPE - CAP OR PLUG
	PIPE - ELBOW DOWN
	PIPE - ELBOW UP
	PIPE - EXPANSION JOINT OR COMPENSATOR
	PIPE - FLANGE
	PIPE - HOSE AND BRAID FLEXIBLE CONNECTION
	PIPE - RUBBER FLEXIBLE CONNECTION
	PIPE - GUIDE
	PIPE - TEE DOWN
	PIPE - TEE UP
	PIPE - UNION
P/T	PRESSURE AND TEMPERATURE TEST PLUG
	PRESSURE GAUGE AND COCK
	REDUCER - CONCENTRIC
	REDUCER - ECCENTRIC
	ROOF/OVERFLOW DRAIN
	STEAM TRAP - FLOAT AND THERMOSTATIC
	STRAINER
	STRAINER WITH VALVE AND BLOW-OFF
	THERMOMETER
	TRAP
	VALVE - ANGLE
	VALVE - BALL
0.5	VALVE - BALANCE (i.e. BALANCE VALVE TO 0.5 GPM)
0.5	VALVE - COMBINATION BALANCE & FLOW MEASURING (i.e. BALANCE VALVE TO 0.5 GPM)
	VALVE - BUTTERFLY
	VALVE - CHECK
	VALVE - SPRING CHECK
	VALVE - GAS (MANUAL)
	VALVE - GLOBE
	VALVE - ISOLATION
	VALVE - NEEDLE
	VALVE - OS&Y
	VALVE - PLUG
	VALVE - PRESSURE REGULATING
	VALVE - PRESSURE REDUCING
	VALVE - PRESSURE RELIEF
	VALVE - PRESSURE & TEMPERATURE RELIEF
VTR	VENT THROUGH ROOF
WH	WALL HYDRANT

DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
TU-101	AIR TERMINAL UNIT
TU-101	AIR TERMINAL UNIT WITH HEATING COIL
VTU-101	VENTURI AIR TERMINAL UNIT
VTU-101	VENTURI AIR TERMINAL UNIT WITH HEATING COIL
	DAMPER - HORIZONTAL FIRE (EXISTING, NEW)
	DAMPER - HORIZONTAL FIRE / SMOKE (EXISTING, NEW)
	DAMPER - SMOKE (EXISTING, NEW)
	DAMPER - VERTICAL FIRE (EXISTING, NEW)
	DAMPER - VERTICAL FIRE / SMOKE (EXISTING, NEW)
BDD	DAMPER - BACK DRAFT
M	DAMPER - MOTORIZED
	DAMPER - VOLUME (MANUALLY ADJUSTABLE)
	DIFFUSER - BLANK OFF
	DIFFUSER - LINEAR SLOT
	DIFFUSER - SQUARE OR RECTANGULAR
	DUCT CROSS SECTION - SUPPLY
	DUCT CROSS SECTION - RETURN
	DUCT CROSS SECTION - EXHAUST
	DUCT - FLEXIBLE CONNECTION
	DUCT - FLEXIBLE DUCT
	DUCT TAKE-OFF - ROUND CONICAL
	DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
	ELBOW - RECTANGULAR WITH TURNING VANES
	ELBOW - RECTANGULAR/ ROUND SMOOTH RADIUS
	ELBOW DOWN - RECTANGULAR
	ELBOW DOWN - ROUND
	ELBOW UP - RECTANGULAR
	ELBOW UP - ROUND
	FAN - AXIAL
	FAN - CENTRIFUGAL (ELEVATION)
	HEATING COIL
D	INCLINED DROP IN DIRECTION OF AIRFLOW
R	INCLINED RISE IN DIRECTION OF AIRFLOW
	INTAKE OR RELIEF HOOD
	REGISTER - RETURN OR EXHAUST
	REGISTER - RETURN WITH BOOT
	REGISTER - TRANSFER GRILLE
	ROOF EXHAUST FAN
	TRANSITION - CONCENTRIC
	TRANSITION - ECCENTRIC
	UNIT HEATER - HORIZONTAL THROW
	UNIT HEATER - VERTICAL THROW

DOUBLE LINE PIPING SYMBOLS

SYMBOL	DESCRIPTION
	VALVE - 2 WAY CONTROL
	VALVE - 3 WAY CONTROL
	VALVE - BUTTERFLY
H	VALVE - CHECK
	VALVE - DETECTOR CHECK
	VALVE - OS&Y HORIZONTAL STEM
	VALVE - OS&Y VERTICAL STEM

DOUBLE LINE PIPING SYMBOLS

SYMBOL	DESCRIPTION
	FLANGE
	FLEX CONNECTION
	STRAINER - BASKET
	STRAINER - Y TYPE

DOUBLE LINE DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
	ELBOW - RECTANGULAR SHORT RADIUS WITH SPLITTER VANES
	ELBOW - ROUND
	ELBOW - RECTANGULAR SMOOTH RADIUS

DOUBLE LINE DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
	DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
	DUCT TAKE-OFF - ROUND CONICAL
	ELBOW - RECTANGULAR WITH TURNING VANES
	ELBOW DOWN - RECTANGULAR
	ELBOW DOWN - ROUND
	ELBOW UP - RECTANGULAR
	ELBOW UP - ROUND
	HEATING COIL
D	INCLINED DROP IN DIRECTION OF AIRFLOW
R	INCLINED RISE IN DIRECTION OF AIRFLOW
	TRANSITION - CONCENTRIC
	TRANSITION -ECCENTRIC

MECHANICAL DRAWING INDEX

STANDARD METHODS OF NOTATION

S-1
10ø
350-4
SUPPLY DIFFUSER WITH SCHEDULE TAG "1",
10" DIAMETER NECK SIZE
350 CFM TYPICAL FOR 4

R-1
22x22
640-2
RETURN REGISTER WITH SCHEDULE TAG "1",
22"x 22" NECK SIZE
640 CFM TYPICAL FOR 2
EXHAUST REGISTER E DESIGNATION SIMILAR.

TU-101
AIR TERMINAL UNIT WITH HEATING COIL NO. 101
WITH SERVICE CLEARANCE SHOWN

VTU-101
VENTURI AIR TERMINAL WITH HEATING COIL NO. 101
WITH SERVICE CLEARANCE SHOWN

(2)WC-1
PLUMBING FIXTURE UNIT IDENTIFICATION TAG
WATER CLOSET TYPE "1"
TYPICAL FOR 2

8
PIPE DIAMETER NOTATION
ALL SIZES IN INCHES

8ø
22x10
18x14ø
DUCT SIZE NOTATION
ALL SIZES IN INCHES
OVAL DUCT
RECTANGULAR DUCT

1
CONSTRUCTION KEY NOTE (NUMBER) OR
DEMOLITION KEY NOTE (LETTER)

EF
1
EQUIPMENT DESIGNATION,
(i.e. EXHAUST FAN NUMBER 1)

HW-1
PIPING RISER DESIGNATION,
(i.e. HOT WATER RISER NUMBER 1)

NEW SYSTEM COMPONENT
EXISTING SYSTEM COMPONENT TO REMAIN
POINT OF NEW CONNECTION SYMBOL

1
M5.1
SECTION OR PLAN NUMBER
SHEET WHERE SECTION IS DRAWN

AREA OF ENLARGEMENT
PLAN NUMBER
SHEET WHERE ENLARGED PLAN IS DRAWN

1
M5.1
SECTION OR PLAN NUMBER
SECTION OR ENLARGED PLAN
SCALE: 1/8" = 1' - 0"
SHEET WHERE SECTION IS CUT OR
ENLARGED PLAN IS REFERENCED

SHEET M1.0
SHEET M1.1
MATCHLINE

HEAVY LINE WEIGHT INDICATES NEW WORK
LIGHT LINE WEIGHT INDICATES EXISTING EQUIPMENT OR REFERENCED INFORMATION
GRAY LINE INDICATES BACKGROUND INFORMATION
DASHED LINES INDICATE PIPING ROUTED BELOW SLAB OR GRADE
HATCH MARKS INDICATE EQUIPMENT OR MATERIALS TO BE DISCONNECTED AND REMOVED.

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.

TCA
ARCHITECTURE + PLANNING + DESIGN

PBA
Peter Basso Associates Inc
CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
Tel: 248-879-5666
Fax: 248-879-0007
www.PeterBassoAssociates.com
PBA Project No.: 2021.0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24
ADDENDUM 1	11/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

MECHANICAL STANDARDS AND DRAWING INDEX

A3C
COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

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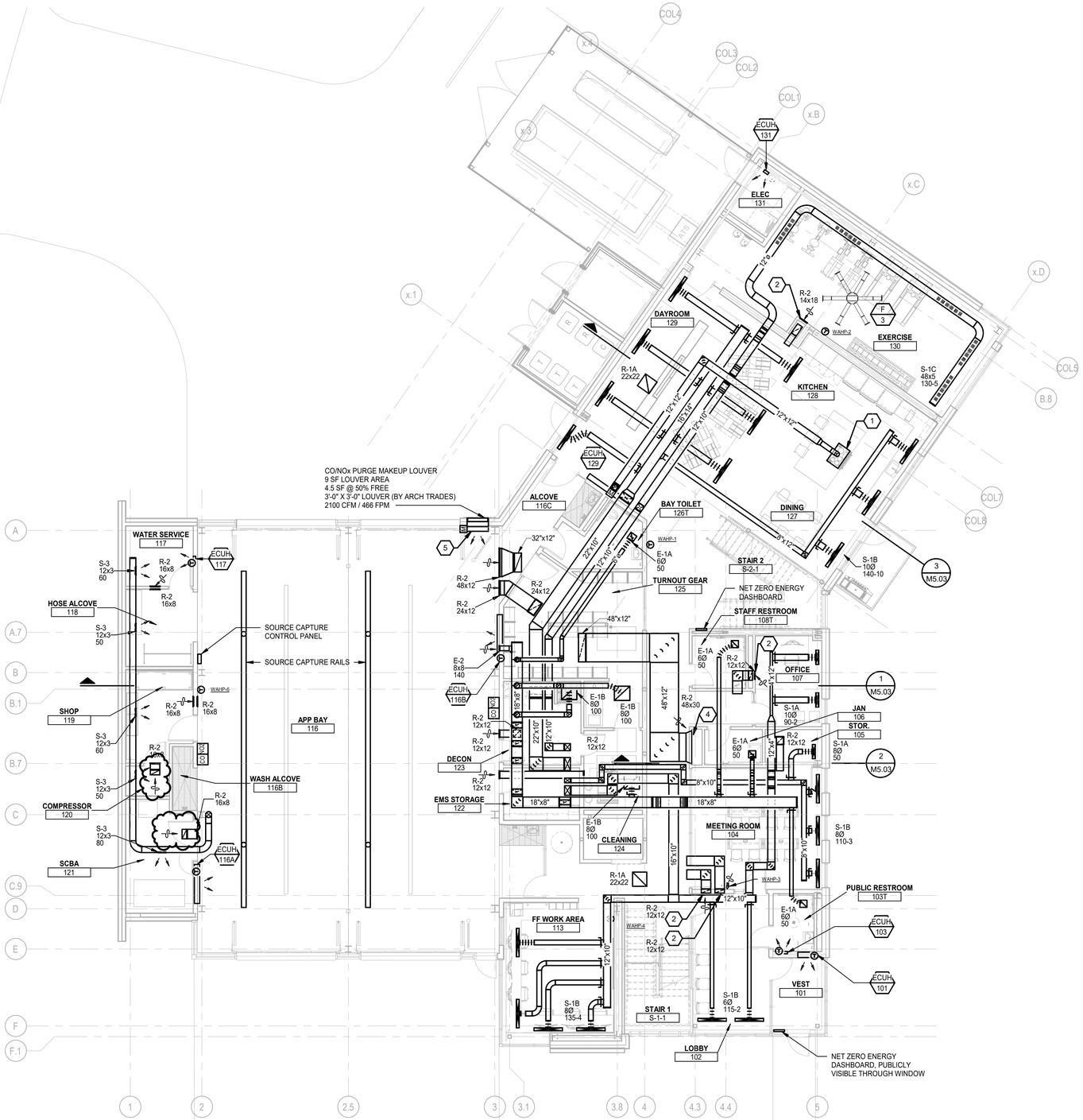
11/11/2024 10:53:35 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



PROJECT TRUE

FIRST LEVEL SHEET METAL PLAN

SCALE: 1/8" = 1'-0"

SHEET METAL GENERAL NOTES:

1 THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER SYSTEMS INCLUDING THE STRUCTURE, PIPING SYSTEMS, ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR OTHER SPACE CONSTRAINTS.

2 INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

3 PIPING AND DUCTWORK SHALL NOT BE INSTALLED ABOVE ELECTRICAL TRANSFORMERS, SWITCHBOARDS, PANELBOARDS OR MOTOR CONTROL CENTERS.

4 COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR DIMENSIONED LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.

7 REFER TO TEMPERATURE CONTROLS STANDARD MOUNTING HEIGHTS DETAIL FOR ELEVATIONS OF WALL MOUNTED TEMPERATURE CONTROL DEVICES.

CONSTRUCTION KEY NOTES:

1 PROVIDE 500 CFM RESIDENTIAL STYLE KITCHEN HOOD WITH INTEGRAL WET CHEMICAL FIRE SUPRESSION SYSTEM, GREASE FILTERS, AND CONTROLLER FOR ASSOCIATED EXHAUST FAN. BASIS OF DESIGN; GREENHECK GRRS.

2 BOTTOM OF RETURN GRILLE 1'-0" AFF UON. TOPOF ARCHITECTURAL RETURN PLENUM OPEN TO CEILING PLENUM UON.

3 AIM NOZZLE DIFFUSER AT BASE OF OPPOSITE WALL. REFER TO SECTION.

4 BOTTOM OF RETURN GRILLE 1'-0" AFF UON. CONNECT RETURN AIR DUCT TO ARCHITECTURAL RETURN AIR TRANSFER PLENUM (REFER TO ARCHITECTURAL).

5 COVER OPENING WITH 1/2" WIRE MESH.

6 AIR RETURNS TO ABOVE THROUGH OPEN SLAT ARCHITECTURAL CEILING

T C A
ARCHITECTURE + PLANNING + DESIGN

Peter Basso Associates Inc
CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
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Fax: 248-879-0007
www.PeterBassoAssociates.com
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STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
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No. 6201068182
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Issue	Date
SCHEMATIC DESIGN	03/04/22
DESIGN DEVELOPMENT	05/26/23
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Drawn: ACF Checked: ACF

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T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

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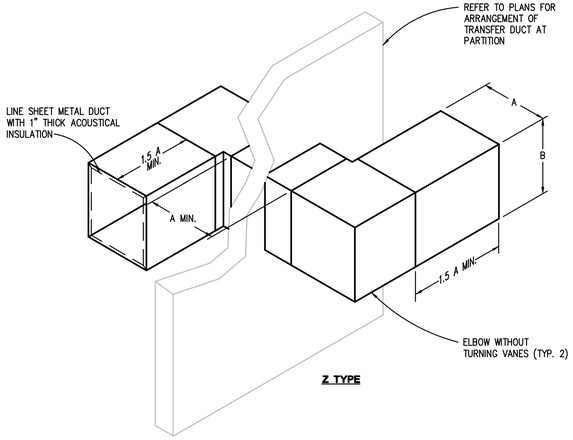

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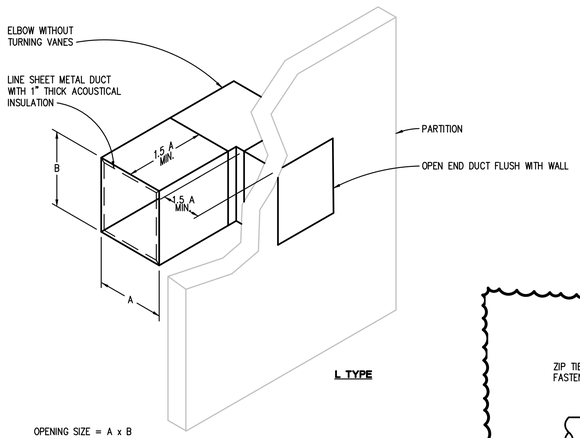

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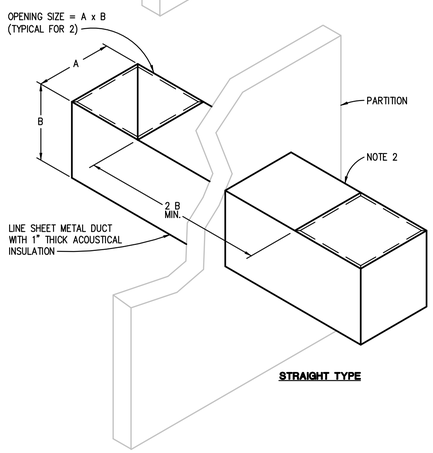
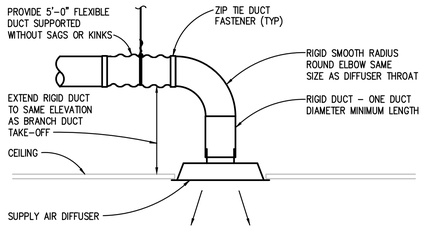


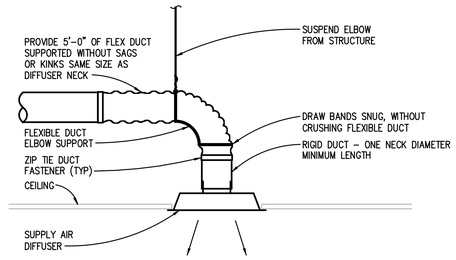
STRAIGHT TYPE

NOTES:
1. WHERE INDICATED ON DRAWING OR WHERE DISTANCE FROM TOP OF DUCT TO SLAB/DECK IS LESS THAN .5B INSTALL Z TYPE DETAIL.
2. SIZE DUCTS FOR 400 FPM MAX BASED ON CLEAR INSIDE DIMENSIONS AND 100% OF THE SUPPLY AIR TO THE SPACE UNLESS OTHERWISE NOTED.
3. ROTATE DETAILS 90° WHERE VERTICAL INSTALLATION IS INDICATED.
4. DIMENSIONS ARE INSIDE CLEAR.

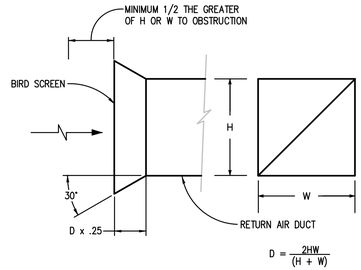
OPTIONS:
1. RIGID FIBER BOARD MAY BE USED IN LIEU OF LINED SHEET METAL DUCT.

AIR TRANSFER DUCT DETAILS
NO SCALE

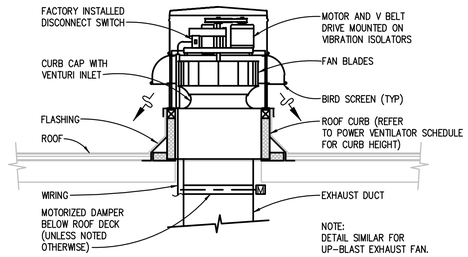




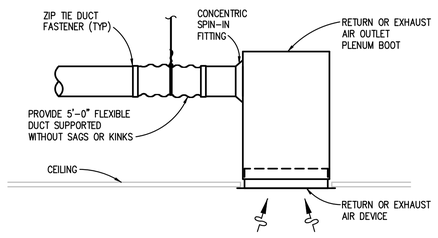
ROUND NECK SUPPLY AIR DIFFUSER DETAIL
NO SCALE

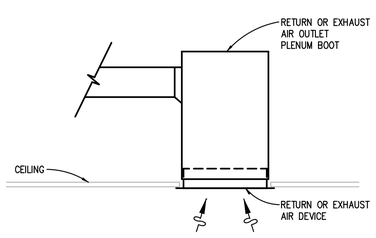


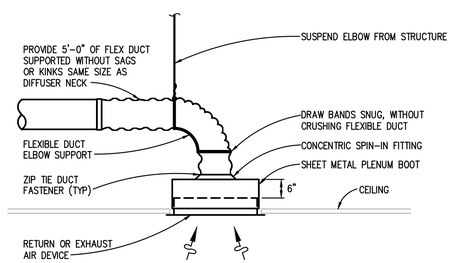
BELLMOUTH DETAIL
NO SCALE

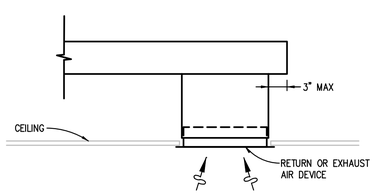


ROOF MOUNTED POWER VENTILATOR EXHAUST FAN DETAIL
NO SCALE



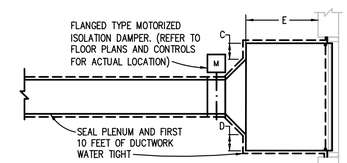






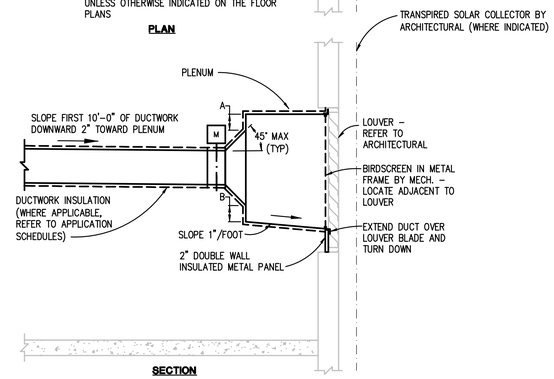
RETURN OR EXHAUST AIR DEVICE INSTALLATION DETAIL
NO SCALE

NOTE: PAINT INTERIOR SURFACE OF PLENUM BOX FLAT BLACK.



NOTE:
DIMENSION "E" = DIMENSION "A", "B", "C", "D", OR 18", WHICHEVER IS THE GREATEST UNLESS OTHERWISE INDICATED ON THE FLOOR PLANS

PLAN



SECTION

OUTDOOR AIR INTAKE OR EXHAUST/RELIEF PLENUM DETAIL
NO SCALE

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ARCHITECTURE + PLANNING + DESIGN

Peter Basso Associates Inc
CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
Tel: 248-879-5666
Fax: 248-879-0007
www.PeterBassoAssociates.com
PBA Project No: 2021-0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 620106182
REGISTERED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24
ADDENDUM 1	11/11/24

Drawn: ACF Checked: ACF

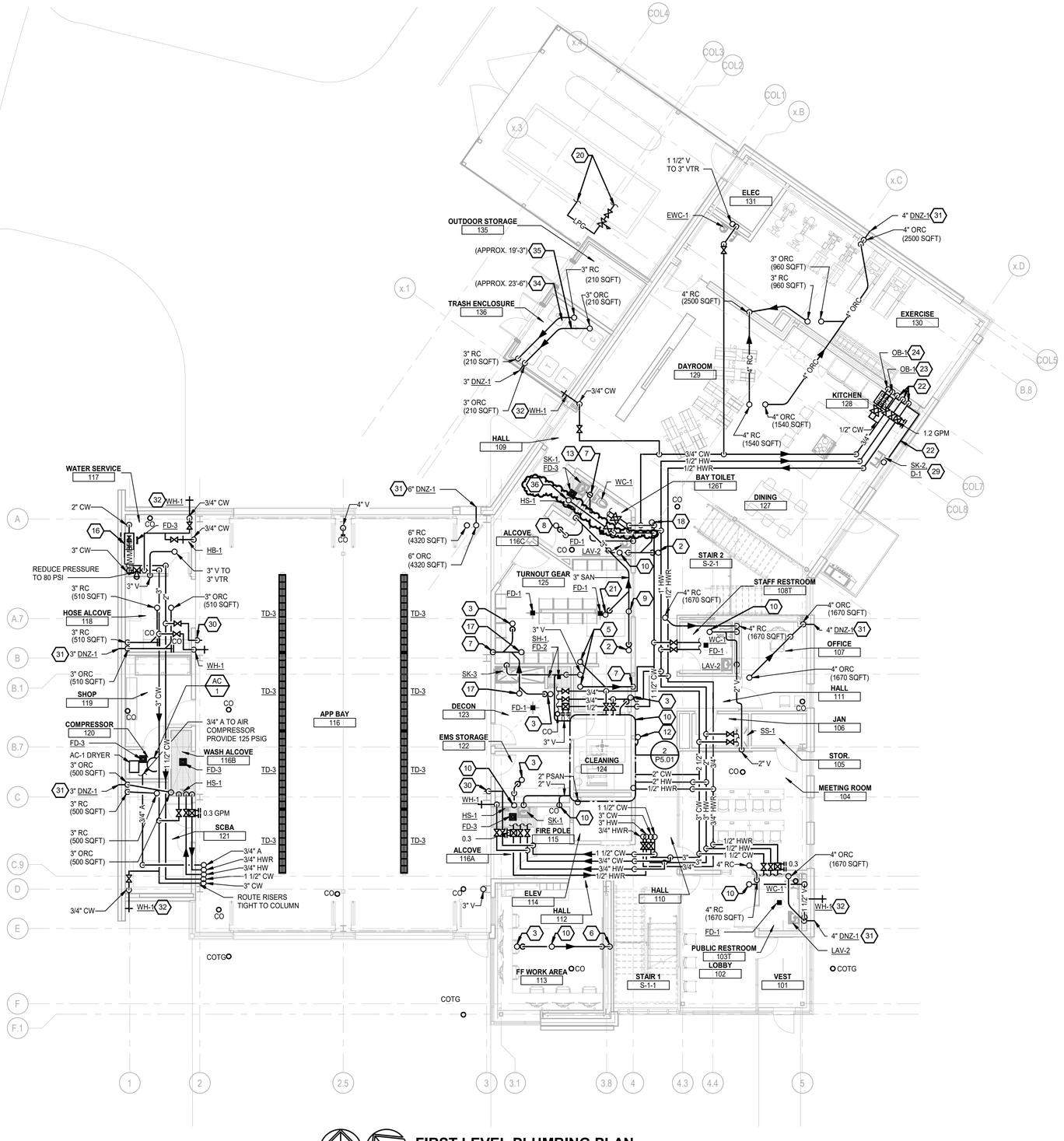
City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

MECHANICAL DETAILS

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

Sheet M6.04

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



FIRST LEVEL PLUMBING PLAN

SCALE: 1/8" = 1'-0"

PROJECT TRUE

PLUMBING GENERAL NOTES:

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4 COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING FIXTURES.

7 HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE 1/2" UNLESS OTHERWISE NOTED.

8 PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.

9 PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

10 MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".

11 WATER SERVICE ENTRANCE PIPING SHALL BE BURIED WITH DEPTH OF COVER OVER TOP OF PIPE OF AT LEAST 72", OR WITH TOP OF PIPE AT LEAST 12" BELOW LEVEL OF MAXIMUM FROST PENETRATION, OR AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, WHICHEVER IS DEEPEST.

CONSTRUCTION KEY NOTES:

1 2" SAN TO FLOOR DRAIN.

2 3" SAN TO FLOOR DRAIN.

3 4" SAN TO FLOOR DRAIN.

4 3" SAN TRANSITION TO 1 1/2" SAN ABOVE FLOOR.

5 4" SAN TO WC.

6 3" SAN.

7 4" SAN.

8 3" SAN TO SS.

9 1 1/2" SAN TO LAV/SINK.

10 2" V.

12 2" SAN TO LAV'S.

13 2" V, 3" VTR.

14 4" V, 4" VTR.

15 4" OSAN TO TRENCH DRAIN.

16 DOMESTIC WATER SERVICE METER AND BACKFLOW ASSEMBLY. REFER TO DOMESTIC WATER METER PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

17 TO CLEANOUT.

18 4" STANDPIPE DRAIN.

19 REFER TO ELEVATOR SUMP PUMP PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

20 ROUTE 4" PROPANE GAS FROM STORAGE TANK TO GENERATOR. PROVIDE ISOLATION VALVE AND PRESSURE REGULATOR (IF NECESSARY). VERIFY CONNECTION LOCATIONS PRIOR TO INSTALLATION.

21 2" SAN TO TRENCH DRAIN.

22 1/2" CW, 1/2" HW & 1/2" HWR IN WALL TO SINK. ROUTE TROUGH CASEWORK CHASE.

23 ROUTE 1/2 CW TO OB-1 THRU CODE APPROVED BACKFLOW PREVENTER TO SERVE COFFEE MAKER. ROUTE IW FROM EQUIPMENT AND BFP NEAREST SINK DRAIN. REFER TO INDIRECT WASTE DRAIN DETAIL ON DRAWING P6.01. COORDINATE MOUNTING HEIGHT OF OUTLET BOX WITH EQUIPMENT.

24 ROUTE 1/2 CW TO OB-1 THRU CODE APPROVED BACKFLOW PREVENTER TO SERVE ICE MACHINE. ROUTE IW FROM BFP TO NEARET SINK DRAIN. REFER TO INDIRECT WASTE DRAIN DETAIL ON DRAWING P6.01. COORDINATE MOUNTING HEIGHT OF OUTLET BOX WITH EQUIPMENT.

25 4" SAN TO TRENCH DRAIN CATCH BASIN.

26 3" SAN TO JUST ABOVE FLOOR. TRANSITION TO 2" SAN TO WASHING MACHINE DRAIN BOX.

27 PROVIDE STRIEM AARDVARK AA-4 SOLIDS INTERCEPTOR. INCLUDE SR-24 RISER IF NECESSARY.

28 1/2 A TO HOSE REEL.

29 PROVIDE DEDICATED SUPPLY VALVE AND ROUTE 1/2" HW FROM SINK HW LINE TO DISHWASHER. ROUTE WASTE FROM DISHWASHER CONNECTION TO SINK WASTE.

30 1 1/2" CW TO WALL MOUNTED THREADED MALE CONNECTION FOR APPARATUS FILL. COORDINATE EXACT TERMINATION WITH OWNER.

31 INSTALL DOWNSPOUT NOZZLE 18" ABOVE GRADE TO TO CENTER OF INLET.

32 INSTALL WALL HYRDRANT 18" ABOVE GRADE TO TO CENTER OF INLET.

33 ROUTE 1" COLD CONDENSATE FROM HVAC UNIT TO NEAREST FLOOR DRAIN

34 PROVIDE HEAT TRACE FROM DRAIN BODY TO FROST LINE DEPTH OF 42" BELOW GRADE.

35 PROVIDE HEAT TRACE FROM DRAIN BODY TO DOWNSPOUT OUTLET OUTLET.

36 3/4" CW TO ROOF HYDRANT. DRAIN TO NEAREST FLOOR DRAIN.

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CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
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Fax: 248-879-0007
www.PeterBassoAssociates.com
PBA Project No.: 2021.0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
SCHEMATIC DESIGN	03/04/22
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24
ADDENDUM 1	11/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

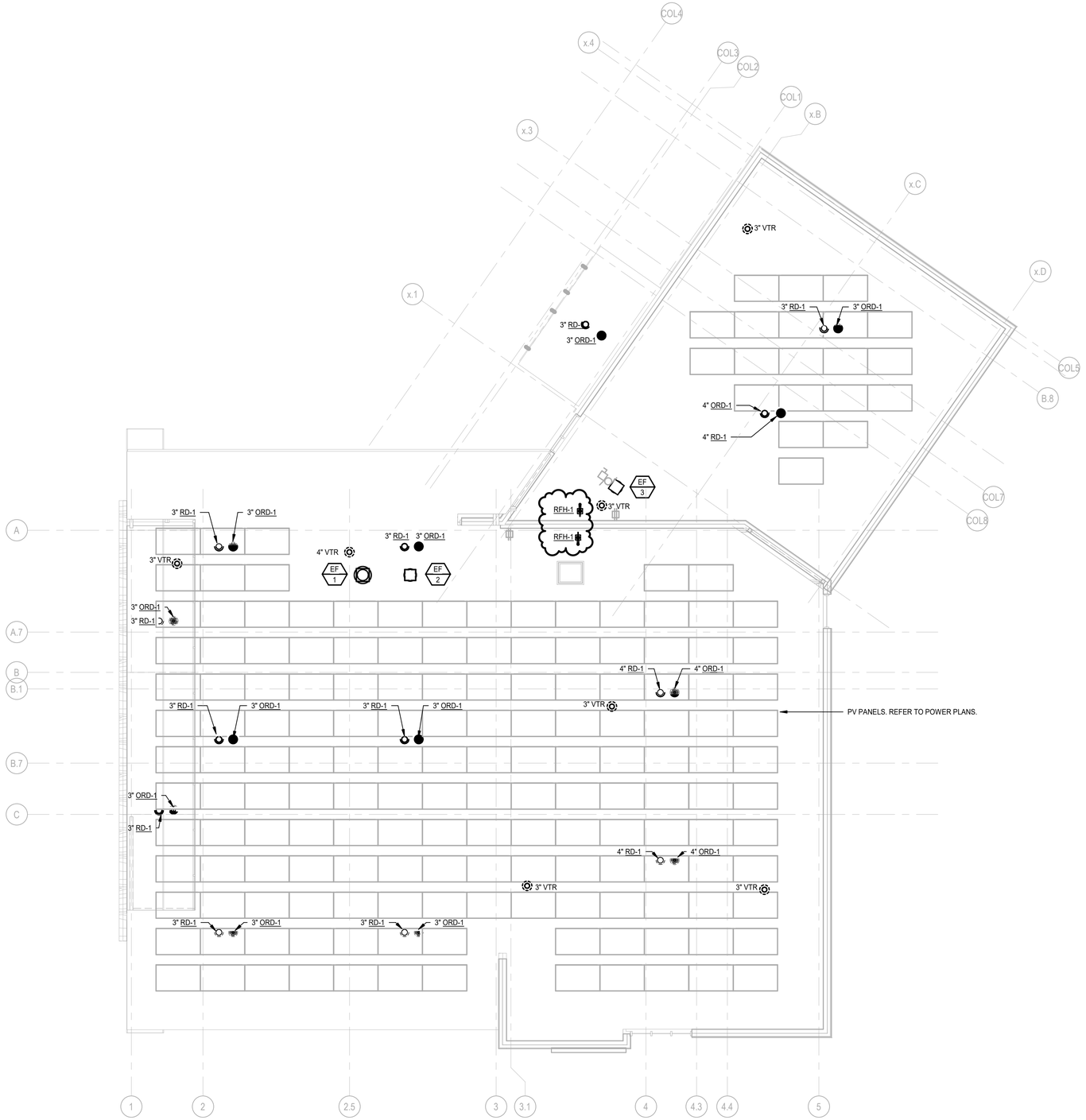
FIRST LEVEL PLUMBING PLAN

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

Sheet P2.01

11/11/2024 9:16:00 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



ROOF PLUMBING PLAN
SCALE: 1/8" = 1'-0"

PROJECT TRUE

PLUMBING GENERAL NOTES:

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5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING FIXTURES.

7 HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE 1/2" UNLESS OTHERWISE NOTED.

8 PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.

9 PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

10 MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".

11 WATER SERVICE ENTRANCE PIPING SHALL BE BURIED WITH DEPTH OF COVER OVER TOP OF PIPE OF AT LEAST 72", OR WITH TOP OF PIPE AT LEAST 12" BELOW LEVEL OF MAXIMUM FROST PENETRATION, OR AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, WHICHEVER IS DEEPEST.

CONSTRUCTION KEY NOTES:

1 2" SAN TO FLOOR DRAIN.

2 3" SAN TO FLOOR DRAIN.

3 4" SAN TO FLOOR DRAIN.

4 3" SAN TRANSITION TO 1 1/2" SAN ABOVE FLOOR.

5 4" SAN TO WC.

6 3" SAN.

7 4" SAN.

8 3" SAN TO SS.

9 1 1/2" SAN TO LAV/SINK.

10 2" V.

12 2" SAN TO LAV'S.

13 2" V, 3" VTR.

14 4" V, 4" VTR.

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17 TO CLEANOUT.

18 4" STANDPIPE DRAIN.

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CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
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PBA Project No: 2021.0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 620106182
PROFESSIONAL ENGINEER

Project Number	21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24
ADDENDUM 1	11/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

ROOF PLUMBING PLAN

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
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Sheet
P2.03

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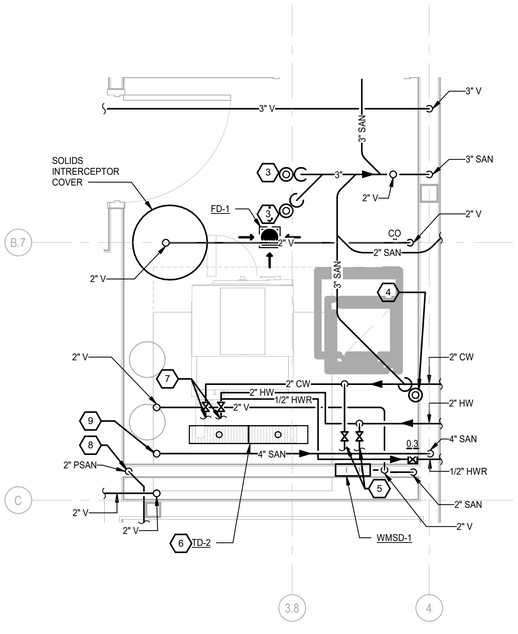
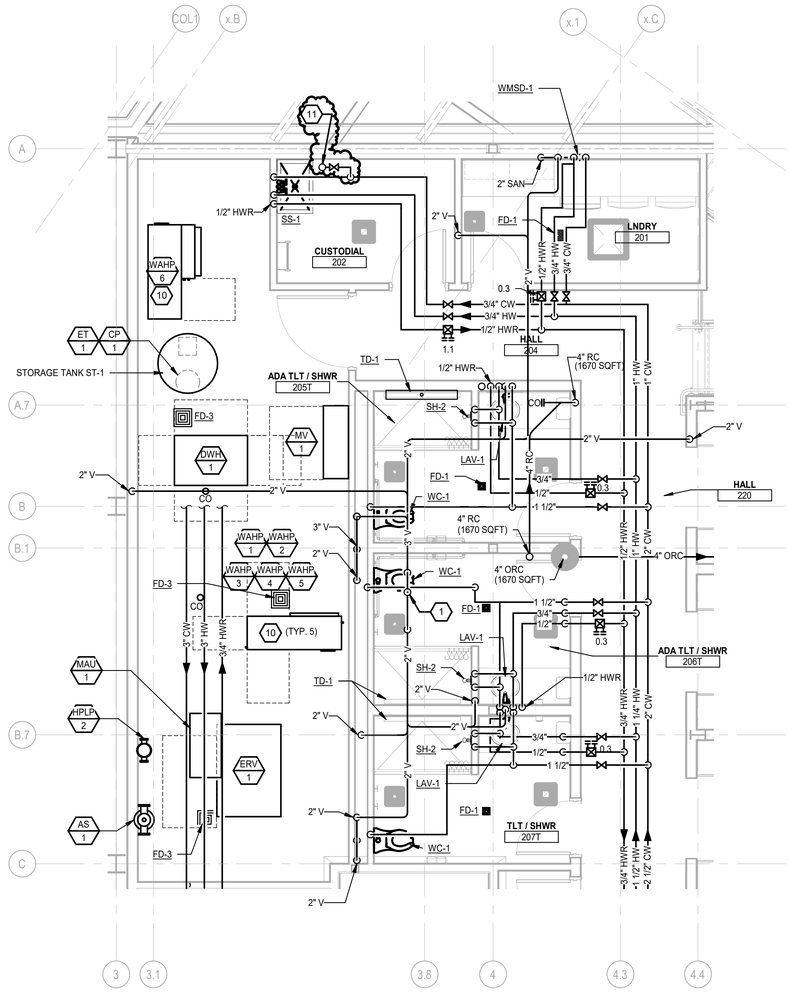
CONSTRUCTION KEY NOTES:

1 2" V, 3" VTR.
3 2" SAN TO TRENCH DRAIN.
4 3" SAN TO FLOOR DRAIN.
5 3/4" CW, 3/4" HW TO CLOTHES WASHER DRAIN BOX.
6 REFER TO MANUFACTURERS INSTALLATION INSTRUCTION FOR TRENCH DRAIN INSTALLATION REQUIREMENTS.
7 2" CW, 2" HW (105 DEGREES) TO WASHER EXTRACTOR. REFER TO MANUFACTURER'S INTALLATION INSTRUCTIONS FOR UTILITY CONNECTIONS.
8 4" STANDPIPE DRAIN.
9 4" SAN TO WATER CLOSET.
10 ROUTE 1" COLD CONDENSATE FROM HVAC UNIT TO NEAREST FLOOR DRAIN.
11 3/4" CW TO ROOF HYDRANT. DRAIN TO NEAREST SERVICE SINK.



2 P2.01 **CLEANING 124 ENLARGED PLUMBING PLAN**
SCALE: 1/2" = 1'-0"



1 P2.02 **SECOND LEVEL ENLARGED PLUMBING PLAN**
SCALE: 1/4" = 1'-0"

T C A
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AARON CHRISTOPHER FRANTZ
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City Of Ann Arbor
NEW FIRE STATION 4
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ANN ARBOR, MI 48104

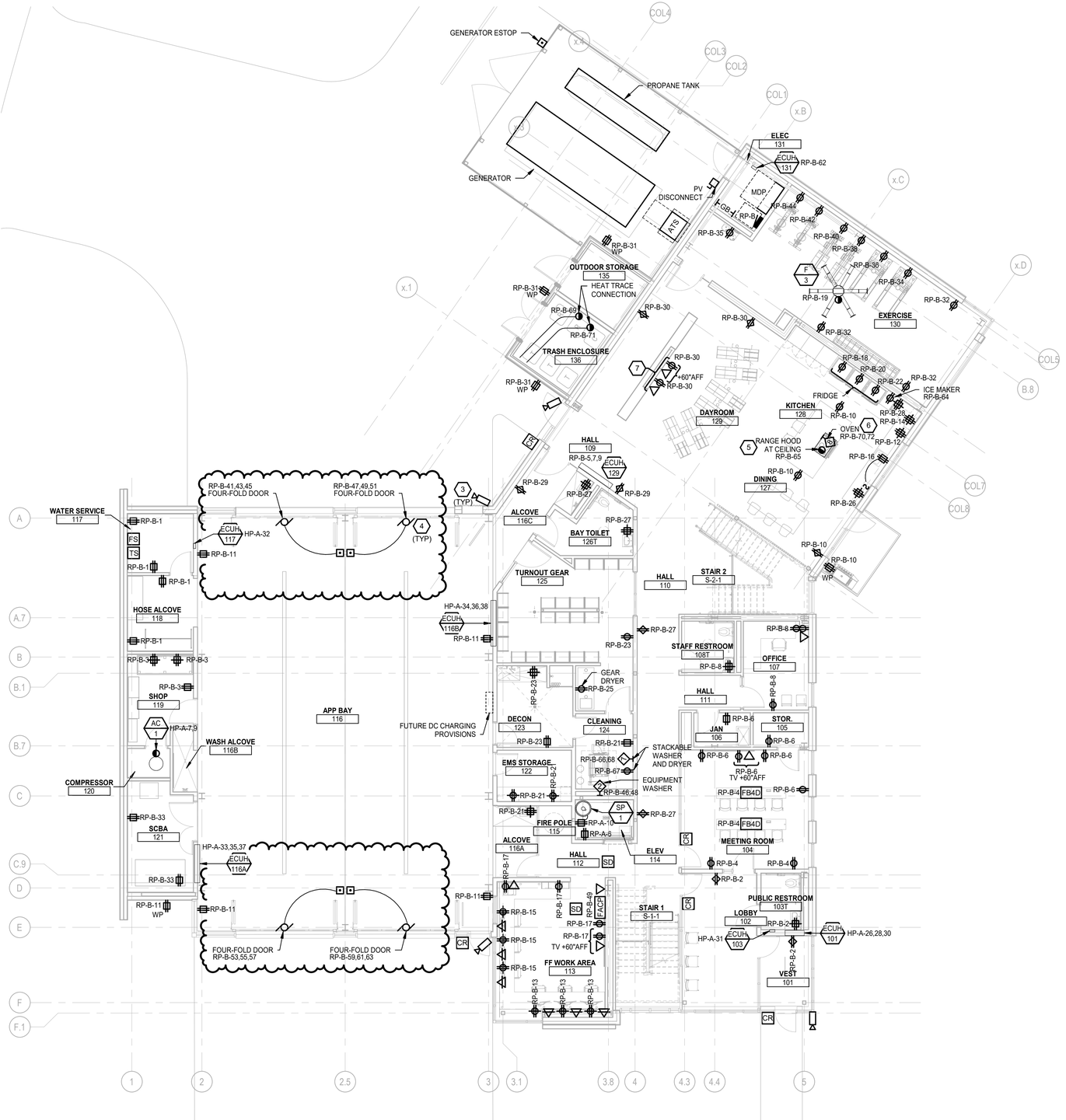
ENLARGED PLUMBING PLANS

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

Sheet
P5.01

11/11/2024 9:16:06 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



FIRST LEVEL POWER AND AUXILIARY PLAN

SCALE: 1/8" = 1'-0"

PROJECT TRUE

ELECTRICAL GENERAL NOTES:

1 THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS. COORDINATE EXACT EQUIPMENT LOCATIONS, ELEVATIONS, AND FINAL CONNECTION REQUIREMENTS. PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS AND OFFSETS.

2 INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

3 COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

4 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

5 TRANSFORMER SECONDARY CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH TRANSFORMER CIRCUIT SIZING SCHEDULE SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.

6 MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH MOTOR CIRCUIT SIZING SCHEDULES SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.

7 COORDINATE THE MOUNTING HEIGHTS OF DEVICES WITH ARCHITECTURAL ELEVATIONS AND THE TRADES INSTALLING THE WORK.

8 COORDINATE EXACT LOCATIONS OF ALL FLOOR SERVICE FITTINGS AND POKE-THROUGH ASSEMBLIES WITH FINAL FURNITURE LAYOUT DRAWINGS.

9 REFER TO MECHANICAL SCHEDULE SHEETS FOR ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT. PROVIDE ALL CONNECTIONS, STARTERS, DISCONNECTS, ETC. AS REQUIRED BY SCHEDULES AND WHERE NOTED ELSEWHERE. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH SHOP DRAWINGS SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN EQUIPMENT SUBMITTALS AND ELECTRICAL DRAWINGS. WHERE CIRCUIT SIZES ARE SHOWN ON THE ELECTRICAL DRAWINGS THAT DIFFER FROM WHAT IS INDICATED ON THE MECHANICAL SCHEDULES, PROVIDE THE CIRCUIT OF HIGHER AMPACITY.

10 REFER TO TEMPERATURE CONTROLS SHEETS FOR REQUIRED FIRE ALARM CONTROL MODULES, DUCT SMOKE DETECTORS, AND MOTOR CONTROLLERS. PROVIDE ALL ACCESSORIES INDICATED.

11 THE FIRE ALARM DEVICES SHOWN ON PLAN ARE A PARTIAL REPRESENTATION OF THE FIRE ALARM SYSTEM. PROVIDE THE DESIGN AND INSTALLATION OF A COMPLETE AND FUNCTIONAL FIRE ALARM SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS, DRAWINGS, AND ALL APPLICABLE CODES. THE FIRE ALARM VENDOR SHALL PROVIDE LAYOUT DRAWINGS INDICATING THE REQUIRED QUANTITIES AND LOCATIONS OF MANUAL PULL STATIONS, NOTIFICATION APPLIANCES, SMOKE AND HEAT DETECTORS, CONTROL MODULES, INTERFACE MODULES, MODULES FOR SPRINKLER FLOW AND TAMPER SWITCHES, ALL CONTROL PANELS, POWER SUPPLIES, AND ADDITIONAL DEVICES AND EQUIPMENT REQUIRED. COORDINATE LOCATIONS OF DEVICES WITH ARCHITECTURAL FINISHES AND REFLECTED CEILING PLANS, INCLUDING ADDITIONAL SMOKE AND HEAT DETECTORS REQUIRED FOR NON-SMOOTH CEILING APPLICATIONS. INCLUDE ALLOWANCES FOR ADJUSTMENT OF DEVICES BY THE ARCHITECT AT THE TIME OF SUBMITTAL TO COORDINATE WITH BUILDING FINISHES AND OTHER CEILING ELEMENTS.

12 REFER TO LIGHTING CONTROL SCHEDULE FOR ROOM CONTROL AND EMERGENCY LIGHTING CIRCUIT CONTROL REQUIREMENTS. DESIGNATION FOR ROOM IS INDICATED AS A LETTERED OVAL SYMBOL.

CONSTRUCTION KEY NOTES:

1 PROVIDE ONE DUCT DETECTOR FOR EACH STACKED WAHP UNIT: FIVE TOTAL.

2 4' CLEAR EDGE DISTANCE FROM ROOF PARAPET AND OTHER OBSTICLES. (TYP)

3 ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT AND BOX ROUGH INS FOR SECURITY DEVICES. COORDINATE EXACT REQUIREMENTS WITH SECURITY CONTRACTOR.

4 COORDINATE EXACT POWER REQUIREMENTS WITH DOOR MANUFACTURER.

5 RANGE DISCONNECT RELAY PROVIDED WITH HOOD. INSTALL DISCONNECT AS REQUIRED BY MANUFACTURER. RANGE TO SHUT DOWN DURING FIRE SUPPRESSION ACTIVATION.

6 COORDINATE FINAL POWER CONNECTION FOR OVEN WITH MANUFACTURER.

7 POWER AND DATA TO BE FED FROM BELOW.

TCA
ARCHITECTURE + PLANNING + DESIGN

Peter Basso Associates Inc
CONSULTING ENGINEERS
5145 Livernois, Suite 100
Troy, Michigan 48098-3276
Tel: 248-879-5666
Fax: 248-879-0007
www.PeterBassoAssociates.com
PBA Project No.: 2021.0121

STATE OF MICHIGAN
ERIC MICHAEL GRAETTINGER
ENGINEER
No. 6201052164
LICENSED PROFESSIONAL ENGINEER

Project Number	21018

Issue	Date
SCHEMATIC DESIGN	03/04/22
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24
ADDENDUM 1	11/11/24

Drawn: SMB Checked: SMB

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

FIRST LEVEL POWER PLAN

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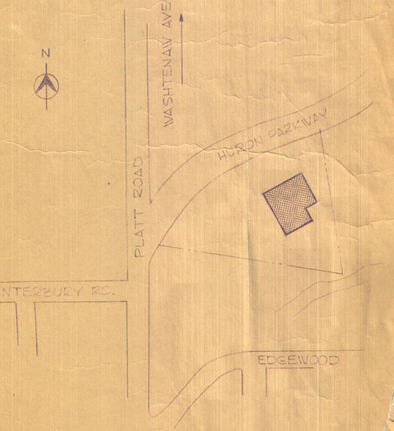
LEGEND :

= NEW GRADE ELEVATION
= EXISTING GRADE ELEVATION
= SLOPE, CONCRETE SLAB & DRIVE
= SITE CONTRACT LIMIT LINE
= TREES TO BE REMOVED
= TREES TO REMAIN, CONTRACTOR SHALL PROTECT TREES THAT ARE TO REMAIN
AGGREGATE PAVING - BASE BID
BITUMINOUS PAVING - ALT NO. A-8

SITE PLAN SCALE 1" = 20'-0"

NOTE:
1. EXTEND AGGREGATE DRIVE TO HURON PARKWAY ROAD & MEET EXISTING GRADE.
2. CITY BENCH MARK #25 - ELEVATION 796.85 5'-0" SOUTH OF BASE OF EXISTING FLAGPOLE IN COMMUNITY PARK.

DRAWING INDEX



LOCATION MAP NO SCALE

SOUTHEAST SIDE FIRE STATION
ANN ARBOR, MICHIGAN

LOCATION MAP
DRAWING INDEX
SITE PLAN

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

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3366 WASHTENAW ROAD • ANN ARBOR, MICHIGAN, 48104 • TELEPHONE 313-663-0586

MARK	DATE	REVISIONS	BY	DRAWN	CHECKED	APPROVED
	4-2-68					

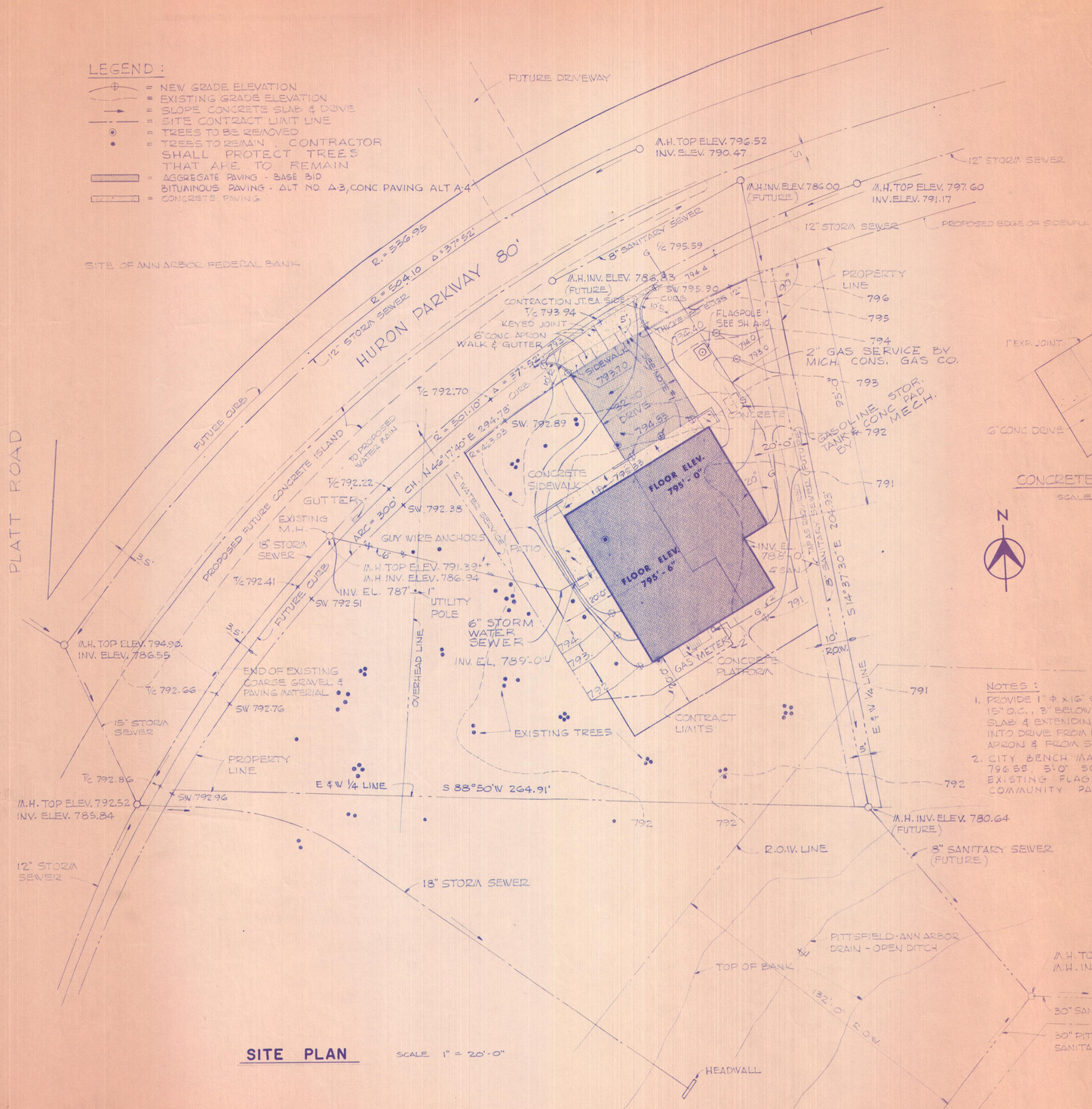
PRELIMINARY
CONSTRUCTION ■
FINAL RECORD □

ARCHITECTS JOB NO. 826

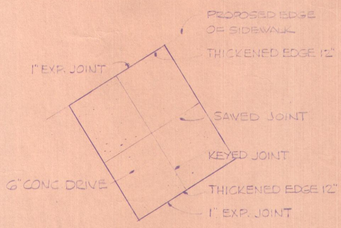
SHEET NO. A-1

DUNN 200 8-63

LEGEND :
= NEW GRADE ELEVATION
= EXISTING GRADE ELEVATION
= SLOPE CONCRETE SLAB & DRIVE
= SITE CONTRACT LIMIT LINE
= TREES TO BE REMOVED
= TREES TO REMAIN, CONTRACTOR SHALL PROTECT TREES THAT ARE TO REMAIN
= AGGREGATE PAVING - BASE BID BITUMINOUS PAVING - ALT NO. A-3, CONC PAVING ALT A-4
= CONCRETE PAVING



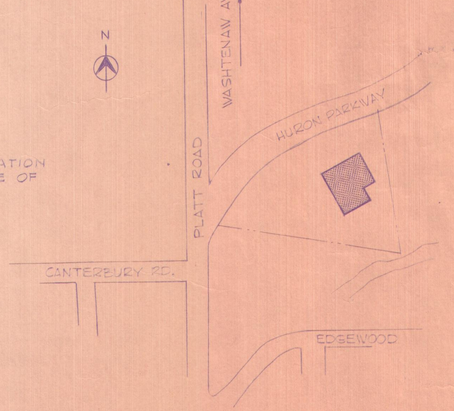
SITE PLAN SCALE 1" = 20'-0"



CONCRETE DRIVE - ALT. A-4
SCALE 1" = 20'-0"

NOTES :
1. PROVIDE 1" ϕ x 16" STEEL DOWELS 15" O.C., 3" BELOW TOP OF SLAB & EXTENDING 8" INTO DRIVE FROM BUILDING APRON & FROM SIDEWALK.
2. CITY BENCH MARK #25 - ELEVATION 796.55, 5'-0" SOUTH OF BASE OF EXISTING FLAGPOLE IN COMMUNITY PARK.

DRAWING INDEX



LOCATION MAP NO SCALE

SOUTHEAST SIDE FIRE STATION
ANN ARBOR, MICHIGAN

LOCATION MAP
DRAWING INDEX
SITE PLAN

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MARK

DATE 4-2-65
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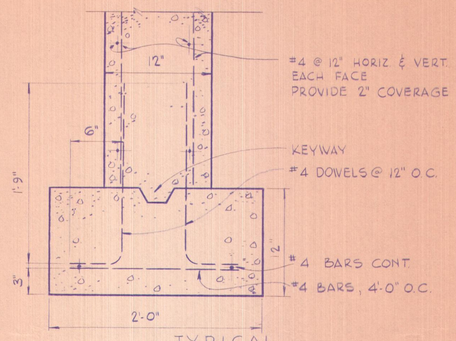
CONSTRUCTION ■
FINAL RECORD □

ARCHITECTS JOB NO. 826

SHEET NO. A-1

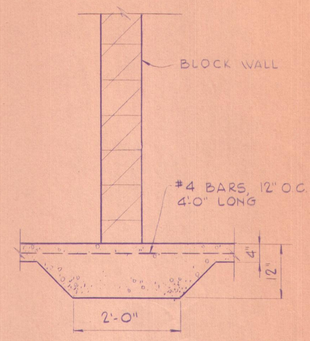
BEAM SCHEDULE			
MARK	SIZE	BEARING	
		EXT WALL	INTERIOR WALL
B-1	12 WF 27	8"X18"X1 1/4" PL	10"X15"X3/8" PL
B-2	3 L 6"X3 1/2"X5/16" L.L.V.		EXTEND 8" BEYOND OP'NG.
B-3	8 WF 31 + 1/4 X 11 PL		11" X 12" X 1/2" PL
B-4	8 B 15	8X10X1/2 PL	
B-5	6 B 12	8X4X1/2 PL	
B-6	6 B 12	7X8X1/2 PL	

LINTEL SCHEDULE		
MAX SPAN	WALL WIDTH	SIZE
4'-0"	6"	ST 4 WF 8.5
4'-0"	8"	2-3X3X1/4" L's
6'-4"	12"	3-4"X3 1/2"X1/4" L.L.V.
4'-0"	12"	3-3X3X1/4" L's



TYPICAL FOUNDATION WALL SECTION

SCALE: 1 1/2" = 1'-0"

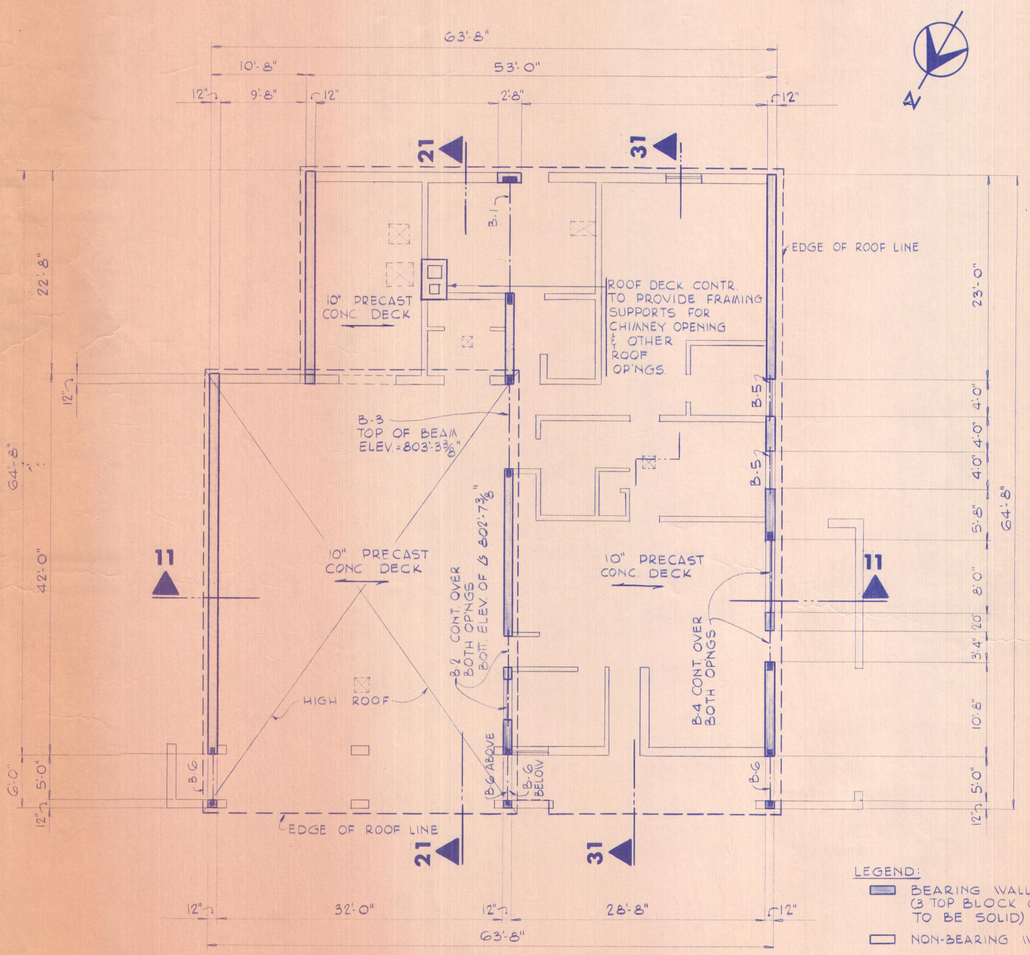


THICKENED SLAB A-2 / S-1

SCALE: 3/4" = 1'-0"

GENERAL NOTES:

1. PROVIDE THICKENED SLAB AS PER DETAIL S-1 UNDER ALL NON-BEARING INTERIOR PARTITIONS.
2. APPARATUS ROOM SLAB TO BE 6" ℄ TO HAVE 6X6 - #6 W.W.M.
3. EXTERIOR CONCRETE SLAB @ APPARATUS ROOM APRON TO BE 8" ℄ TO HAVE #5 BARS @ 5" O.C. SHORT WAY & #4 BARS @ 9" O.C. LONG WAY.
4. EXTERIOR CONCRETE SLABS @ NORTH WALL TO BE 6" ℄ TO HAVE #4 BARS @ 9" BOTH WAYS.
5. ALL OTHER INTERIOR & EXTERIOR CONCRETE SLABS TO BE 4" ℄ TO HAVE 6X6 #10 W.W.M.



FRAMING PLAN SCALE: 1/8"=1'-0"

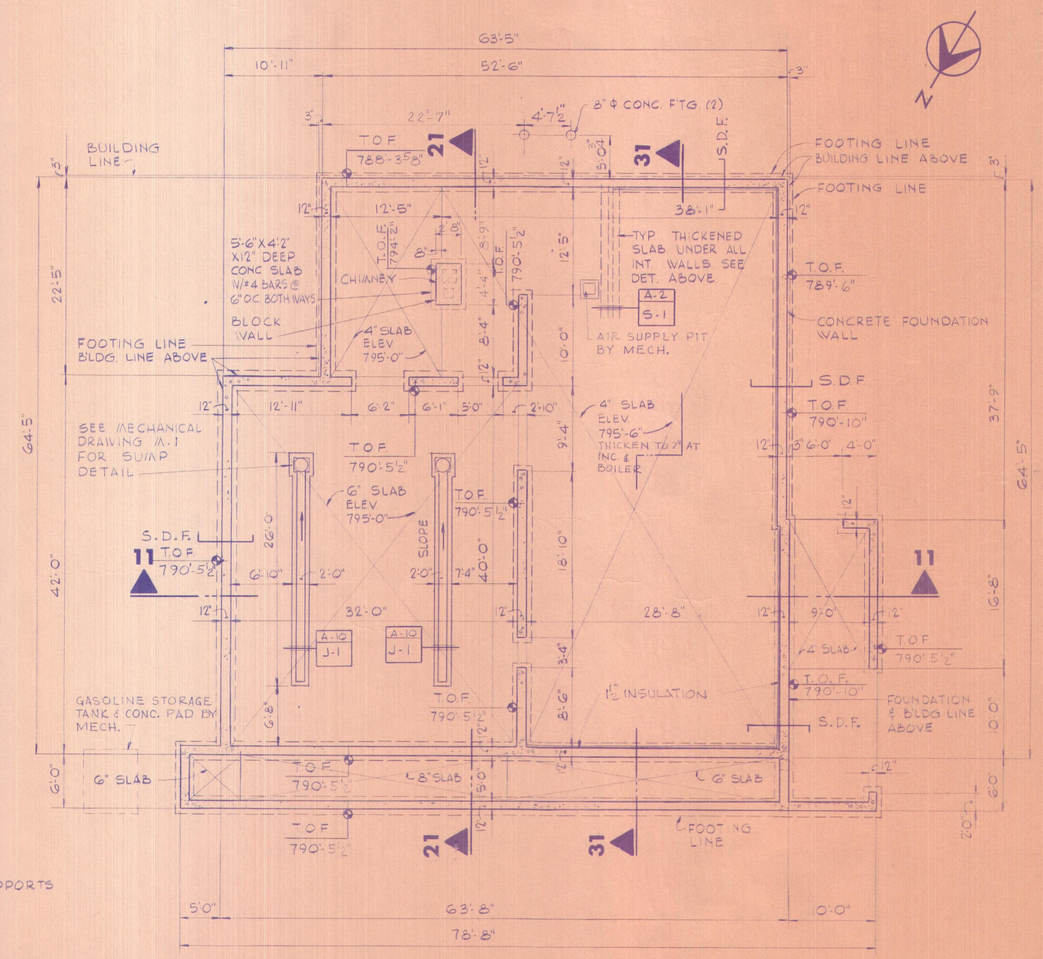
LEGEND:

- BEARING WALLS & BEAM SUPPORTS (3 TOP BLOCK COURSES TO BE SOLID)
- NON-BEARING WALLS
- CURBED OP'NGS VERIFY SIZE & LOCATION W/ MECH.

DETAIL SHEET / DETAIL NO. / ON LOCATION SHEET

LOCATION SHEETS — DETAIL SHEET / DETAIL NO. / ON DETAIL SHEET

DETAIL INDICATION



FOUNDATION PLAN SCALE: 1/8"=1'-0"

FOUNDATION PLAN
FRAMING PLAN
DETAILS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

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DRAWN D.K. CHECKED VAP APPROVED

BY

REVISIONS

MARK

DATE 4-5-65

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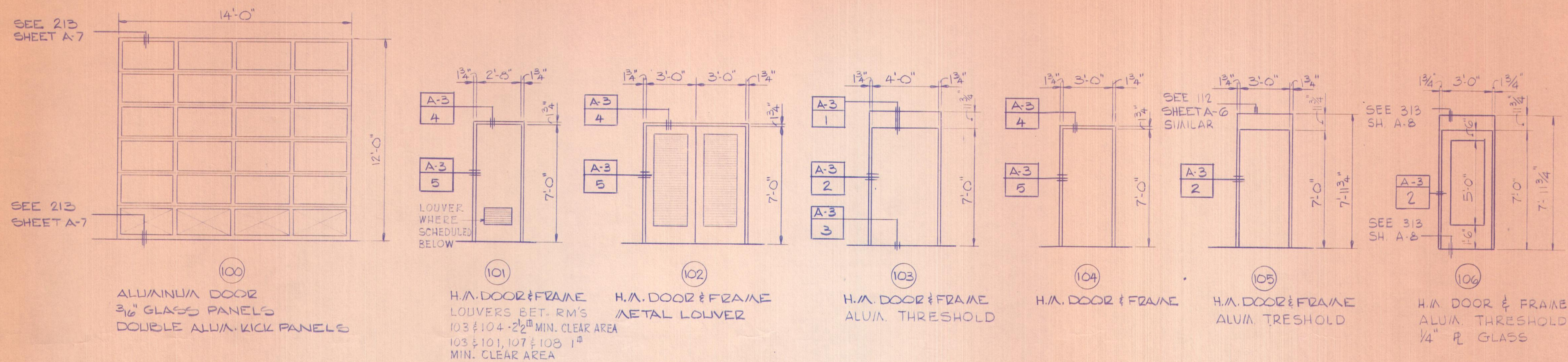
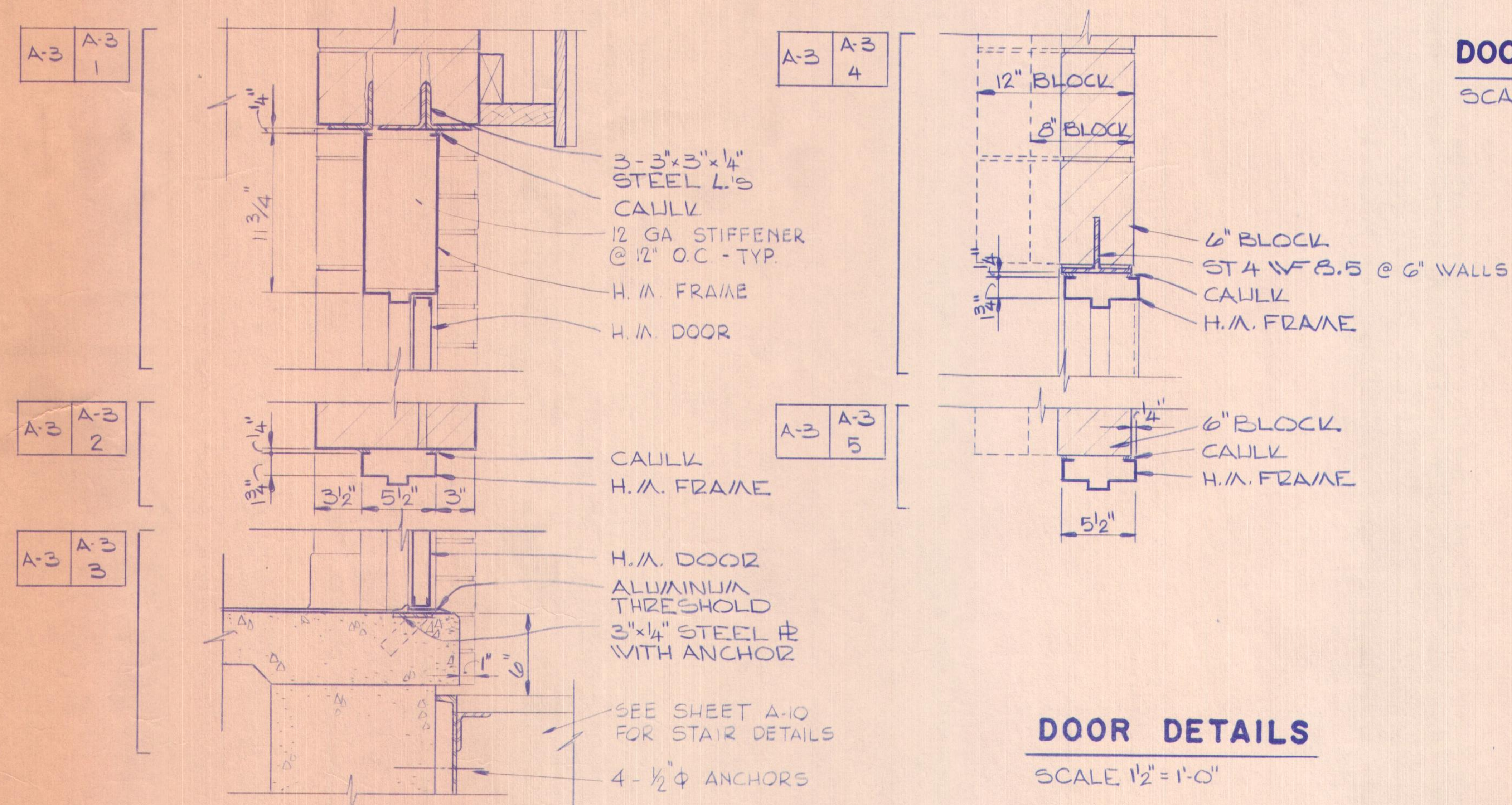
ARCHITECTS JOB NO. 826

SHEET NO. A-2



DOOR ELEVATION

SCALE 1/4" = 1'-0"

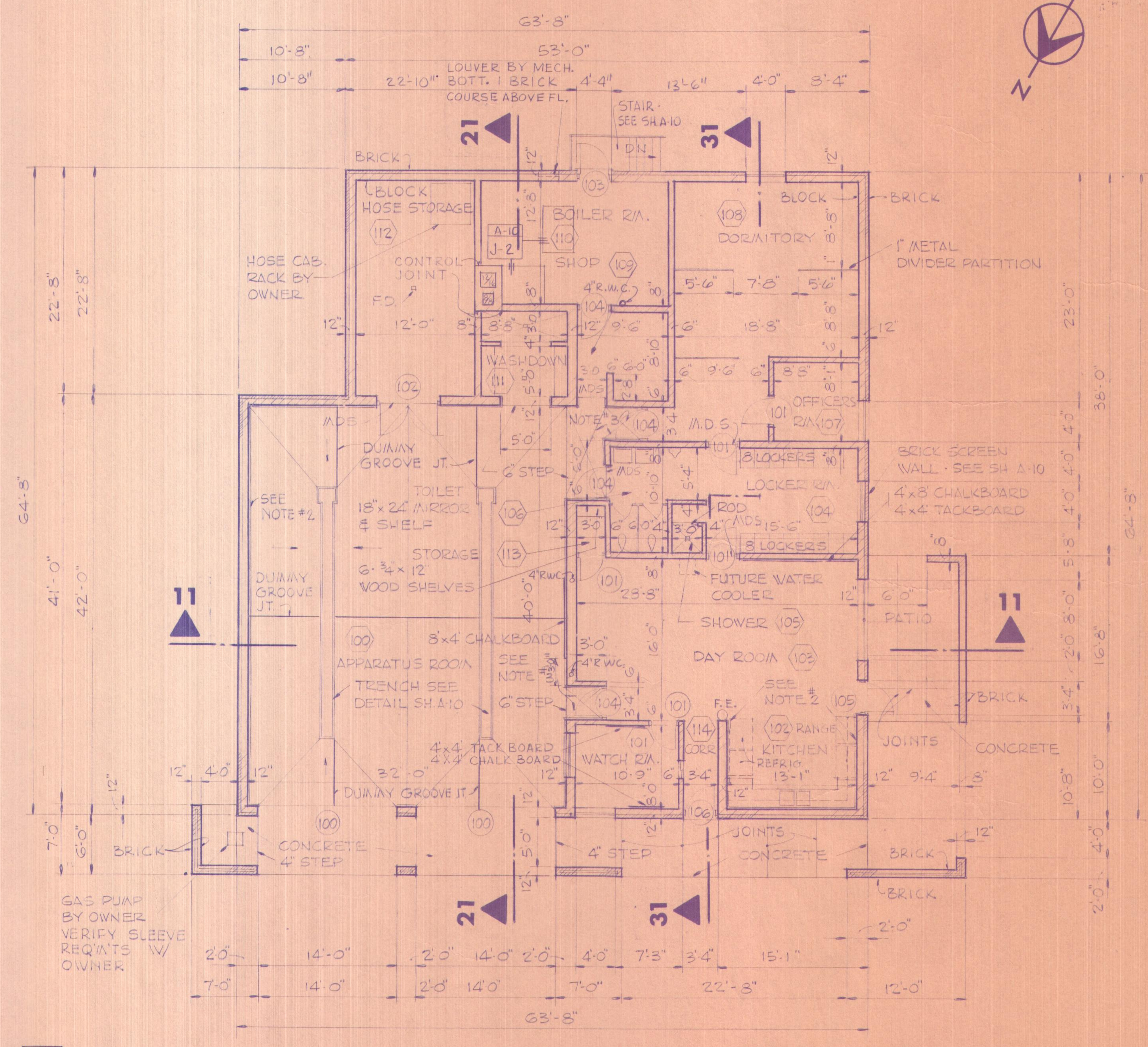


DOOR DETAILS

SCALE 1 1/2" = 1'-0"

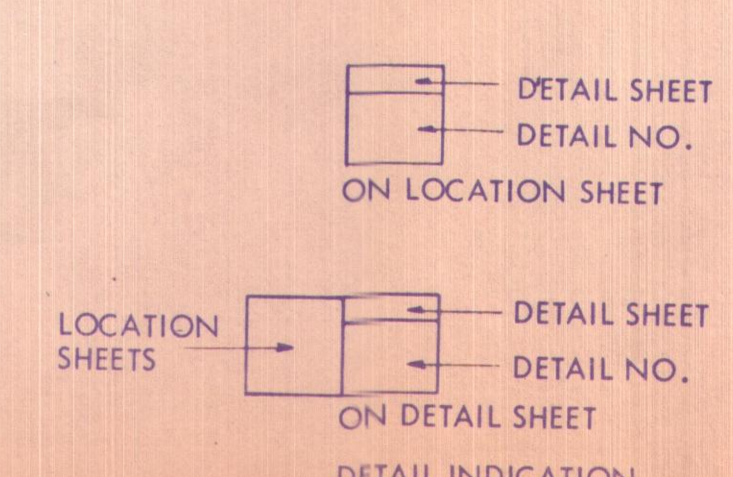
NOTES

1. APPARATUS ROOM - PROVIDE METAL DIVIDER STRIP @ DOOR 102 AS PART OF ALT #1.
2. ALT #2 - LIGHT LINE INDICATES EXTENT OF VITREOUS WALL SURFACING.
3. FLOOR - ASPHALT TILE W/ METAL EDGE STRIP - SEE SHEET A-10 FOR DETAIL.
4. FOR ELEVATIONS OF LOCKER ROOM & KITCHEN SEE SHEET A-5
5. PROVIDE STORAGE CABINETS ABOVE LOCKERS SEE SHEET A-10 FOR DETAILS
6. PROVIDE METAL SHELVING IN WASHDOWN ROOM SEE DETAIL SHEET A-10.
7. INSTALL 1 - 12"×12" FLUE & 1 - 8"×8" FLUE AT CHIMNEY PROVIDE METAL CLEAN OUT DOOR AT BASE OF EACH FLUE



FIRST FLOOR PLAN

SCALE 1/8" = 1'-0"



FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS MAT'L	WALLS FINISH	CEILING MAT'L	CEILING FINISH	CEILING HEIGHT	REMARKS	ALTERNATES A1	ALTERNATES A2
		1 ASPHALT TILE, 2 VITREOUS FL., 3 CONC. SEALED	1 4" VINYL, 2 CERAMIC TILE, 3 NONE	1 BLOCK, 2 6'-0" CERAMIC TILE	1 PAINTED, 2 VITREOUS, 3 NONE	1 EXPOSED, 2 LAY-IN PANELS	1 PAINTED, 2 NONE			1 VITREOUS TROWELED FLOORING	2 VITREOUS WALL SURFACE
100	APPARATUS	3	1	1	1	1	1	13'-7 3/8"	CHALK BD.	1	2
101	WATCH	1	1	1	1	2	2	8'-0"			
102	KITCHEN	1	1	1	1	2	2	8'-0"			2
103	DAY ROOM	1	1	1	1	2	2	8'-0"	CHALK & TACK BD.		
104	LOCKER	2	1	1	2	1	1	9'-1 3/8"	MILLWORK		
105	SHOWER	2	2	1 2	1	1	1	9'-1 3/8	CURTAIN ROD		
106	TOILET	2	1	1	2	1	1	9'-1 3/8"	MET. PART'NS - MIRR. - SHELF		
107	OFFICERS	1	1	1	1	2	2	8'-0"			
108	DORMITORY	1	1	1	1	2	2	8'-0"	MET. DIVIDING PART'NS		
109	SHOP	3	3	1	1	1	1	9'-1 3/8"			
110	BOILER RM.	3	3	1	1	1	2	9'-1 3/8"			
111	WASHDOWN	2	2	1	2	1	1	9'-1 3/8"			
112	HOSE STOR	3	3	1	1	1	1	9'-7 3/8"			
113	STORAGE	1	1	1	1	1	2	9'-1 3/8"			
114	CORRIDOR	1	1	1	1	2	2	8'-0"			

SOUTHEAST SIDE FIRE STATION

ANN ARBOR MICHIGAN

LANE, RIEBE, WEILAND · ARCHITECTS

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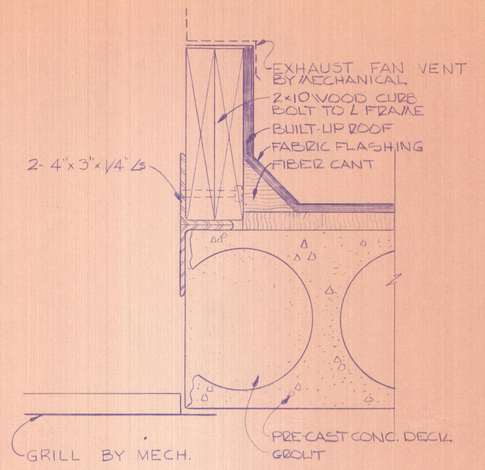
DATE 4-2-65

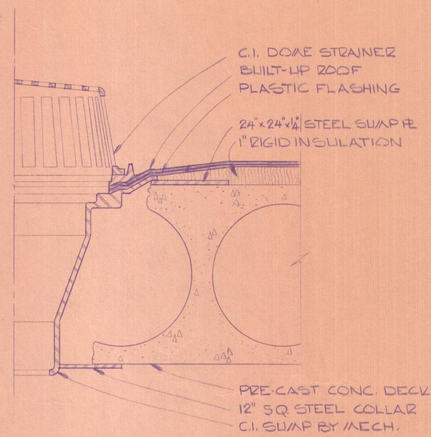
ARCHITECTS JOB NO. 826

SHEET NO. A-3

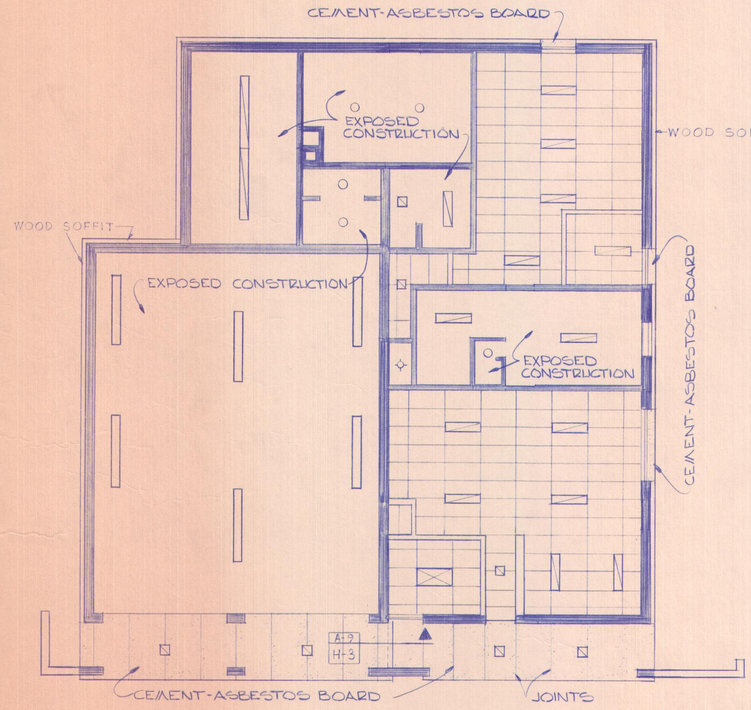
FIRST FLOOR PLAN
FINISH SCHEDULE
DOORS & DETAILS



ROOF CURB DETAIL
SCALE 3"=1'-0"

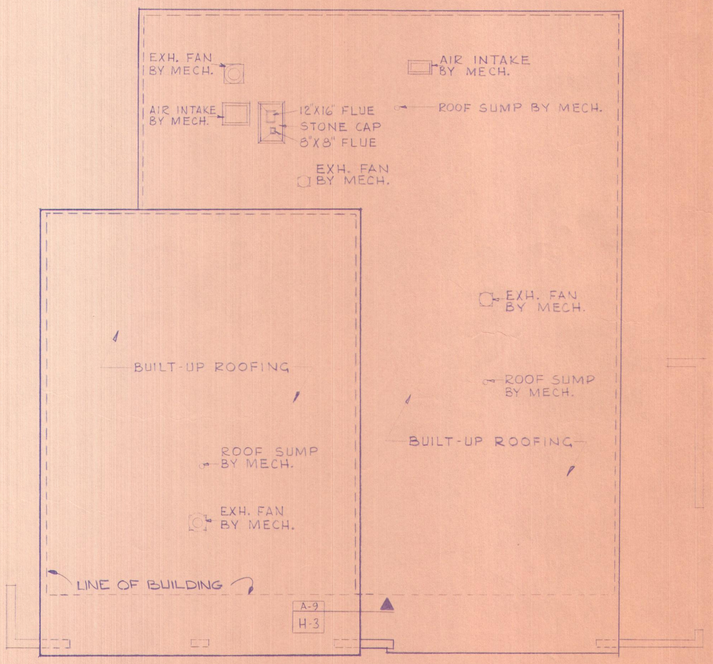


ROOF SUMP DETAIL
SCALE 3"=1'-0"



NOTES:
- WALLS GO UP TO DECK
- SURFACE MOUNTED FIXTURE
- RECESSED FIXTURE
- STEM HUNG FIXTURE

CEILING PLAN SCALE: 1/8"=1'-0"



NOTE:
PROVIDE OPENINGS & CURBS AS REQUIRED. VERIFY WITH MECH. NUMBER, SIZE, & LOCATION OF OPENINGS

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

ROOF PLAN
CEILING PLAN
DETAILS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

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BY | DRAWN AFA | CHECKED WAF | APPROVED

REVISIONS | MARK

DATE 4-2-65
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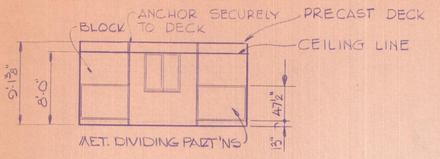
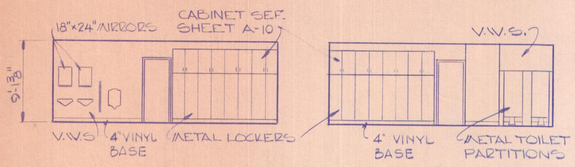
ARCHITECTS JOB NO. 826

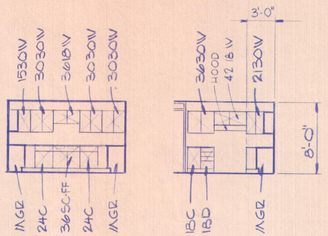
SHEET NO. A-4



S. WALL DORMITORY



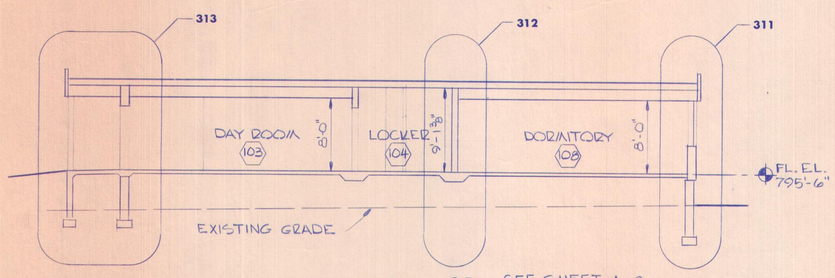
S. WALL TOILET & LOCKER RM. N. WALL LOCKER & TOILET RM.



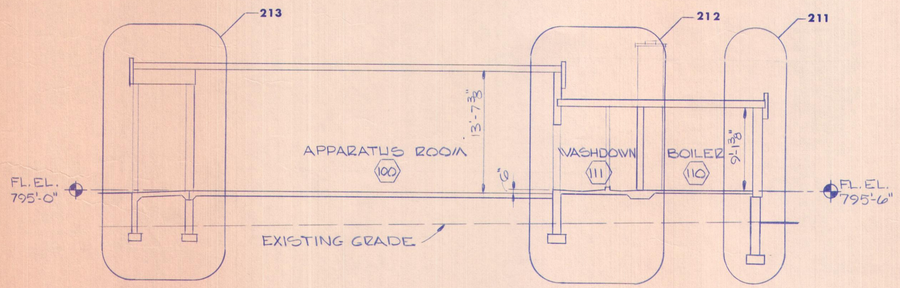
N. WALL KITCHEN

W. WALL KITCHEN

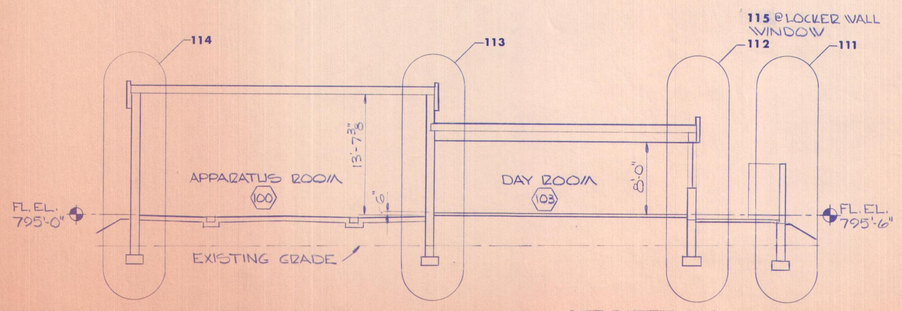
INTERIOR ELEVATIONS SCALE: 1/8" = 1'-0"



SECTION 31 SEE SHEET A-8 FOR WALL SECTIONS



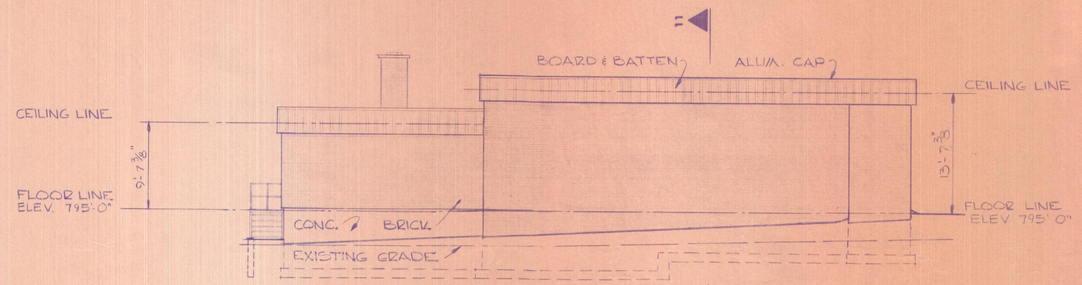
SECTION 21 SEE SHEET A-7 FOR WALL SECTIONS



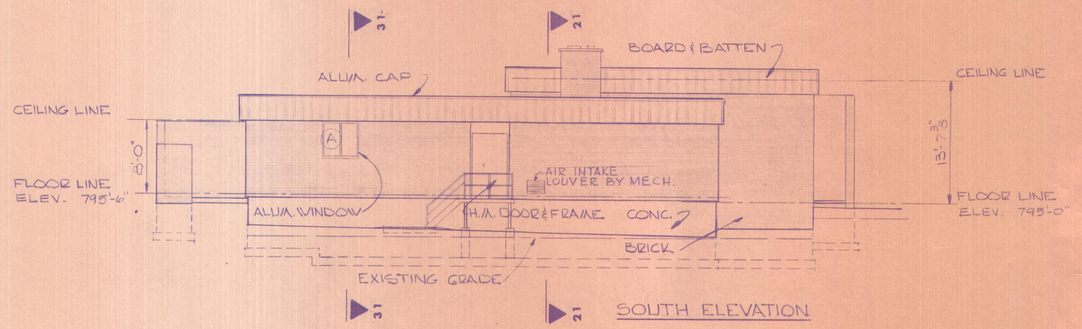
SECTION 11 SEE SHEET A-6 FOR WALL SECTIONS

BUILDING SECTIONS

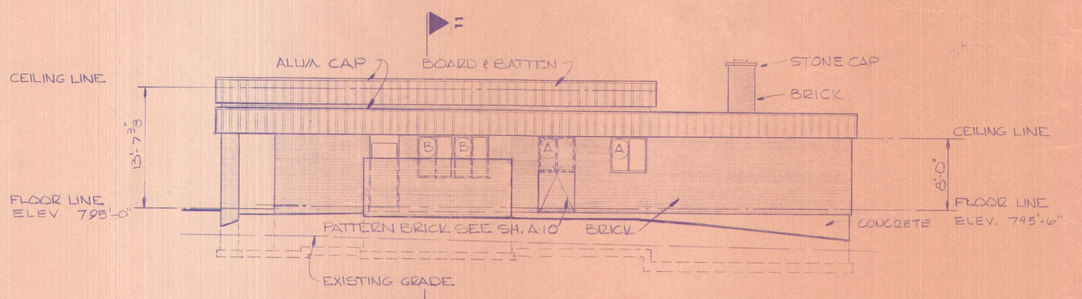
SCALE: 1/8" = 1'-0"



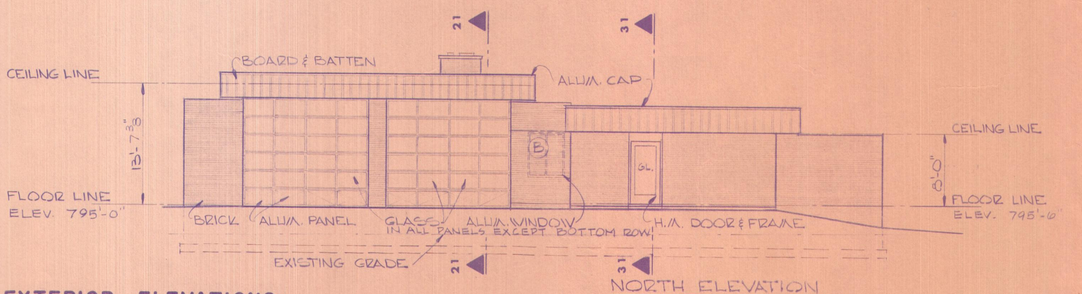
EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION



NORTH ELEVATION

EXTERIOR ELEVATIONS SCALE: 1/8" = 1'-0"

EXTERIOR ELEVATIONS
INTERIOR ELEVATIONS
BUILDING SECTIONS

SOUTHEAST SIDE FIRE STATION

ANN ARBOR MICHIGAN

LANE, RIEBE, WEILAND • ARCHITECTS
3366 WASHTENAW ROAD • ANN ARBOR, MICHIGAN, 48104 • TELEPHONE 313-663-0586

DRAWN: JAP/A CHECKED: W.A.P. APPROVED:

BY:

REVISIONS:

MARK

DATE: 4/2/65

PRELIMINARY: ☐

CONSTRUCTION: ■

FINAL RECORD: ☐

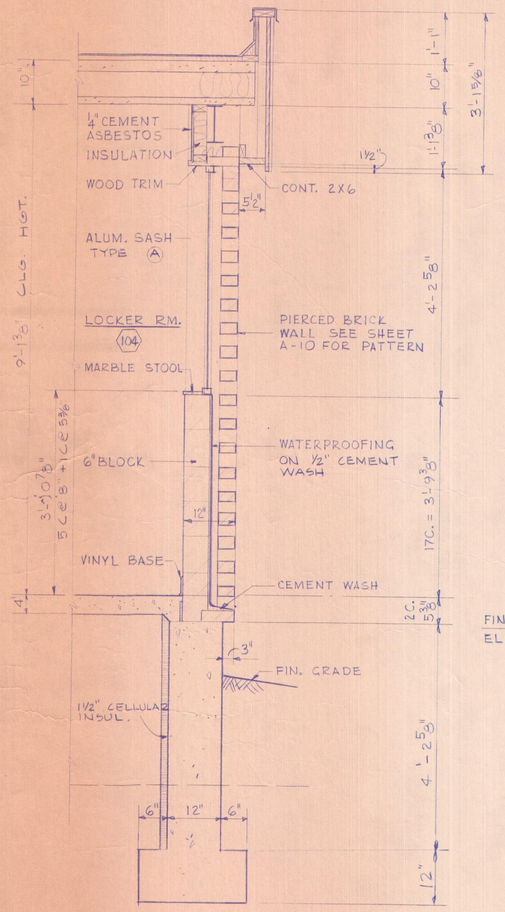
ARCHITECTS JOB NO.

826

SHEET NO.

A-5

DUNN 200 9-63



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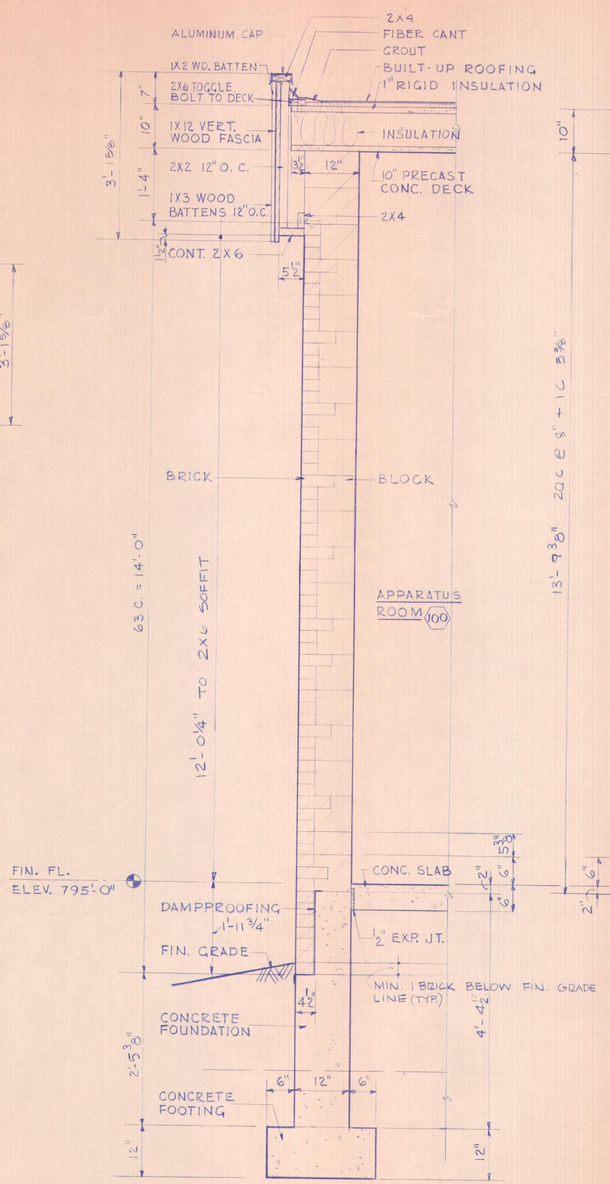

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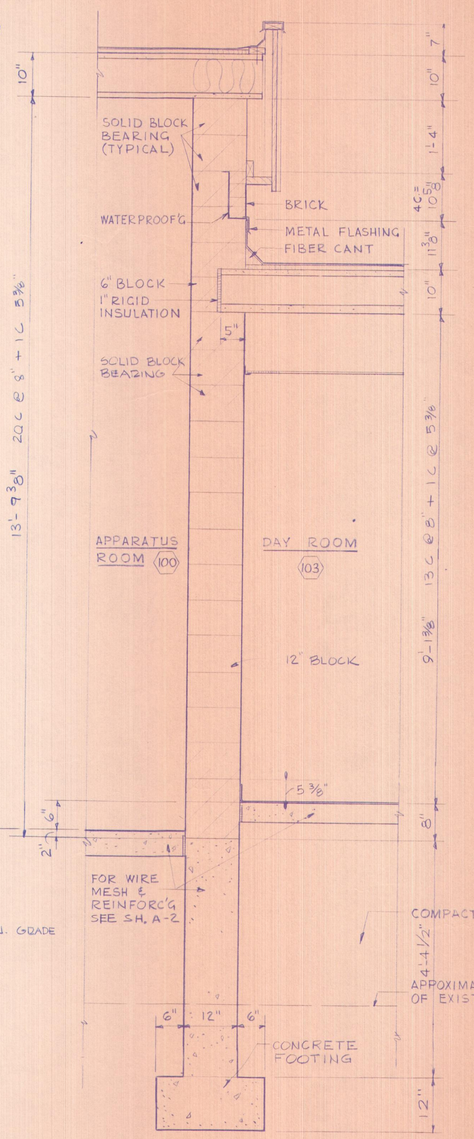

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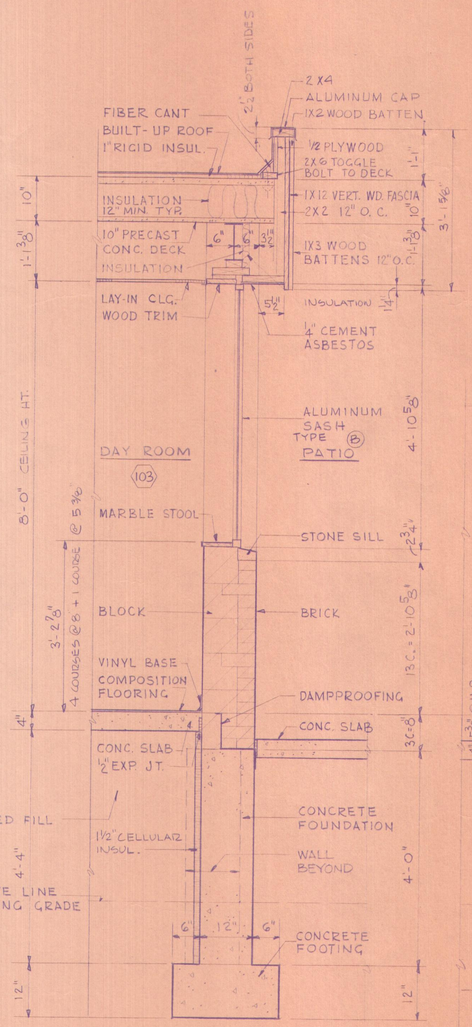

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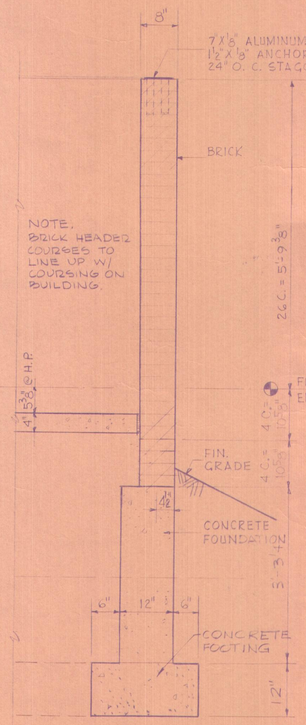


111

TYPICAL BLOCK COURSING SECTION

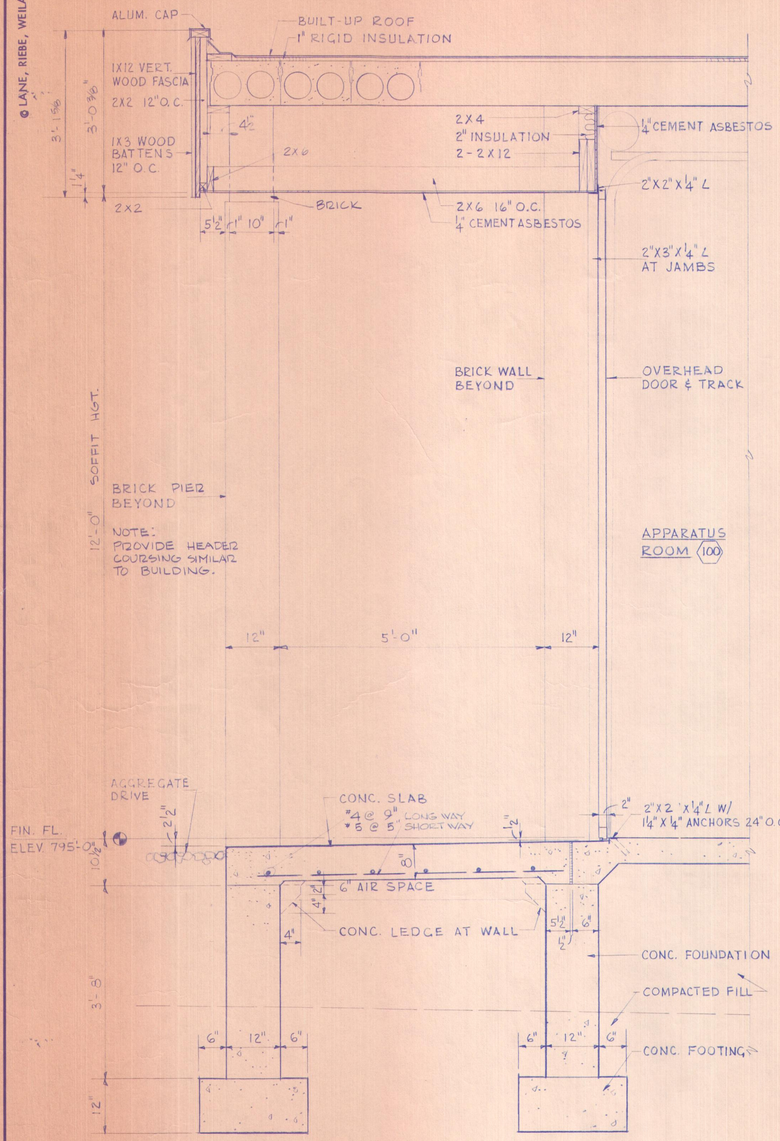
SCALE: 3/4"= 1'-0"

WALL SECTIONS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

LANE, RIEBE, WEILAND • ARCHITECTS
3366 WASHTENAW ROAD • ANN ARBOR, MICHIGAN, 48104 • TELEPHONE 313-663-0586

DRAWN R.H.
CHECKED W.A.P.
APPROVED
BY
REVISIONS
MARK
DATE 4/2/65
PRELIMINARY
CONSTRUCTION
FINAL RECORD
ARCHITECTS JOB NO. 826
SHEET NO. A-6



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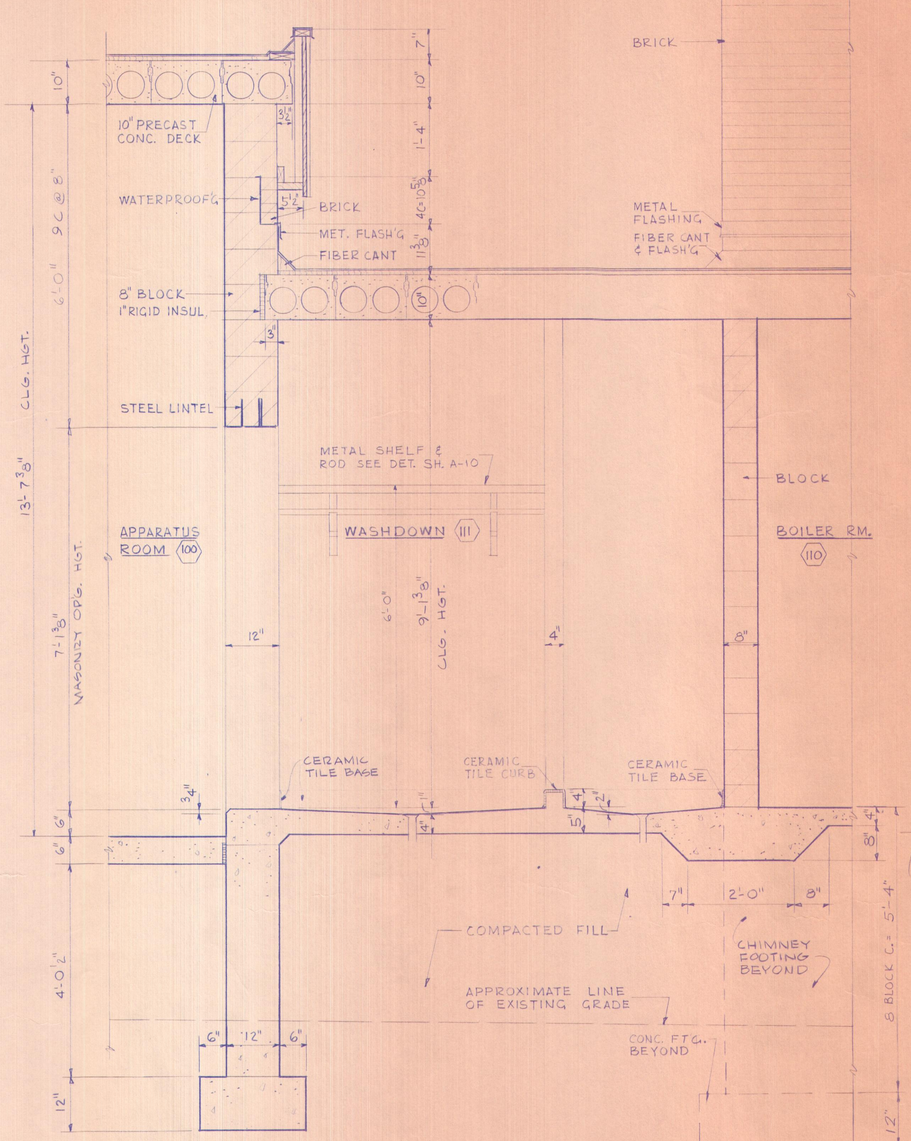

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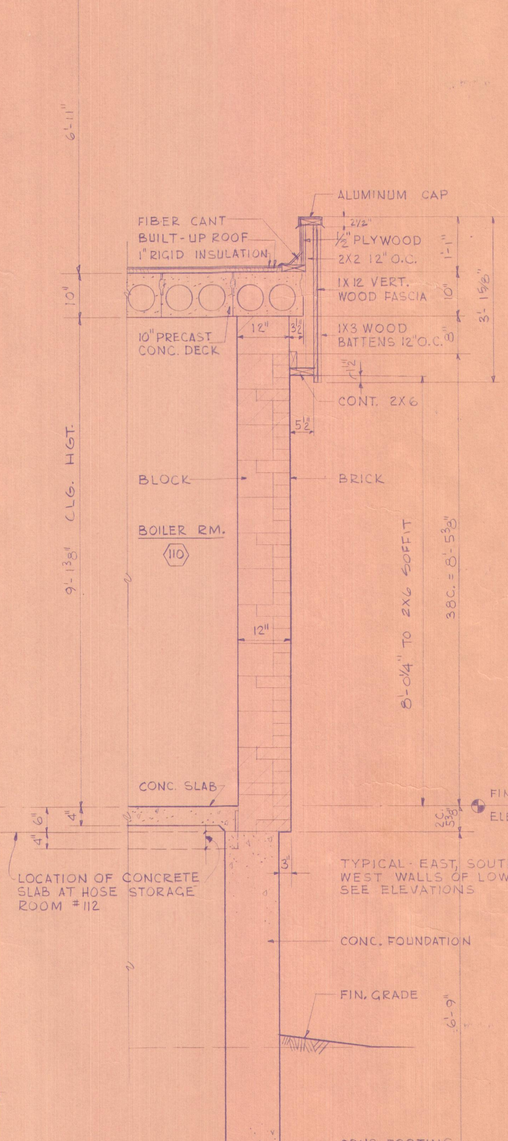

211

SCALE: 3/4" = 1'-0"

WALL SECTIONS

SOUTHEAST SIDE FIRE STATION
MICHIGAN
ANN ARBOR

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DRAWN S.H.
CHECKED W.A.P.
APPROVED

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DATE 4/2/65
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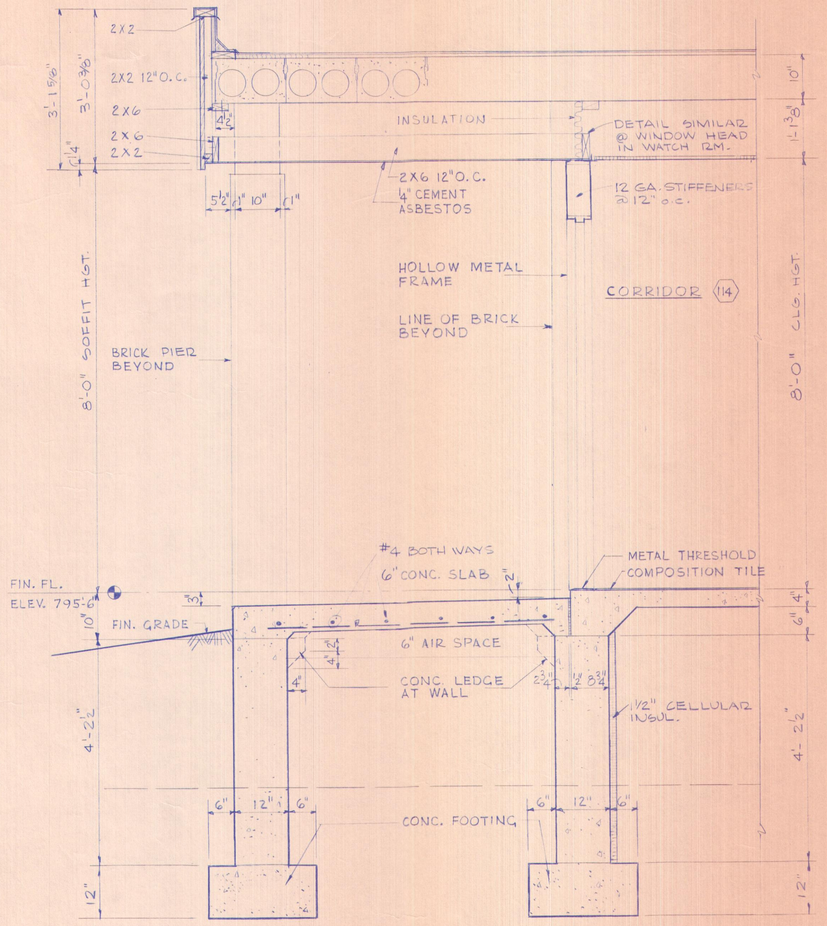
CONSTRUCTION ■
FINAL RECORD ☐

ARCHITECTS JOB NO. 826

SHEET NO. A-7



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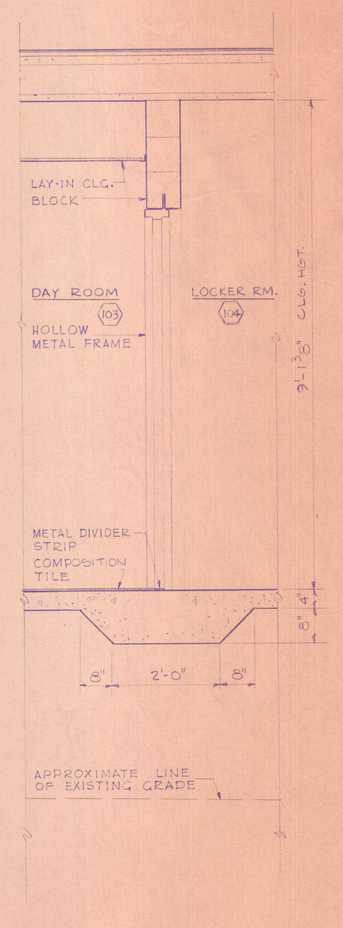

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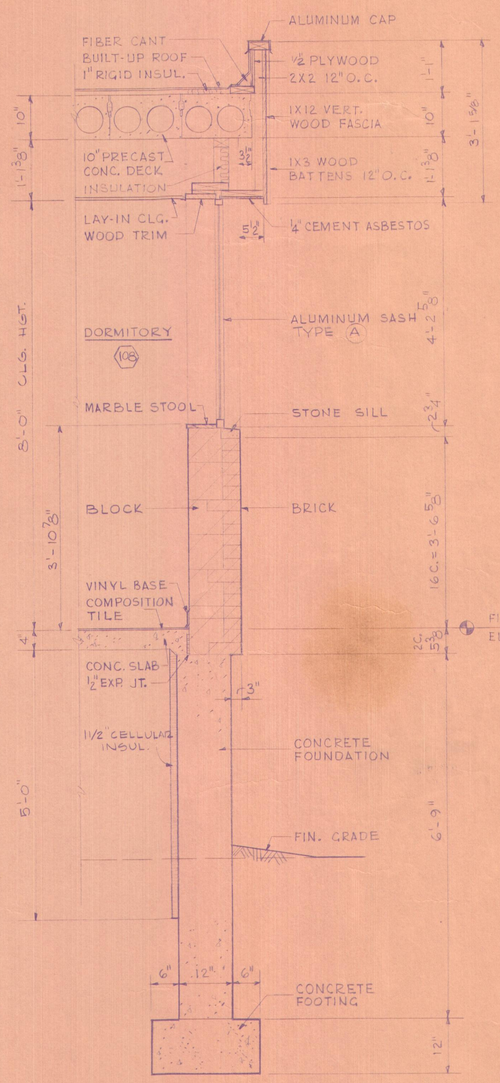

311

SCALE: 3/4"= 1'0"

WALL SECTIONS

SOUTHEAST SIDE FIRE STATION
MICHIGAN
ANN ARBOR

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BY
DRAWN R. H.
CHECKED W.A.R.
APPROVED

REVISIONS

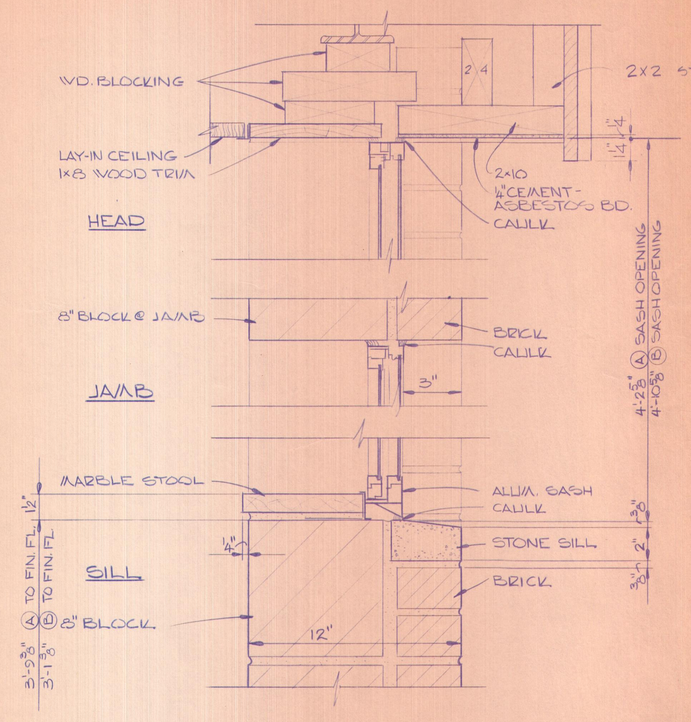
MARK

DATE 4/2/65

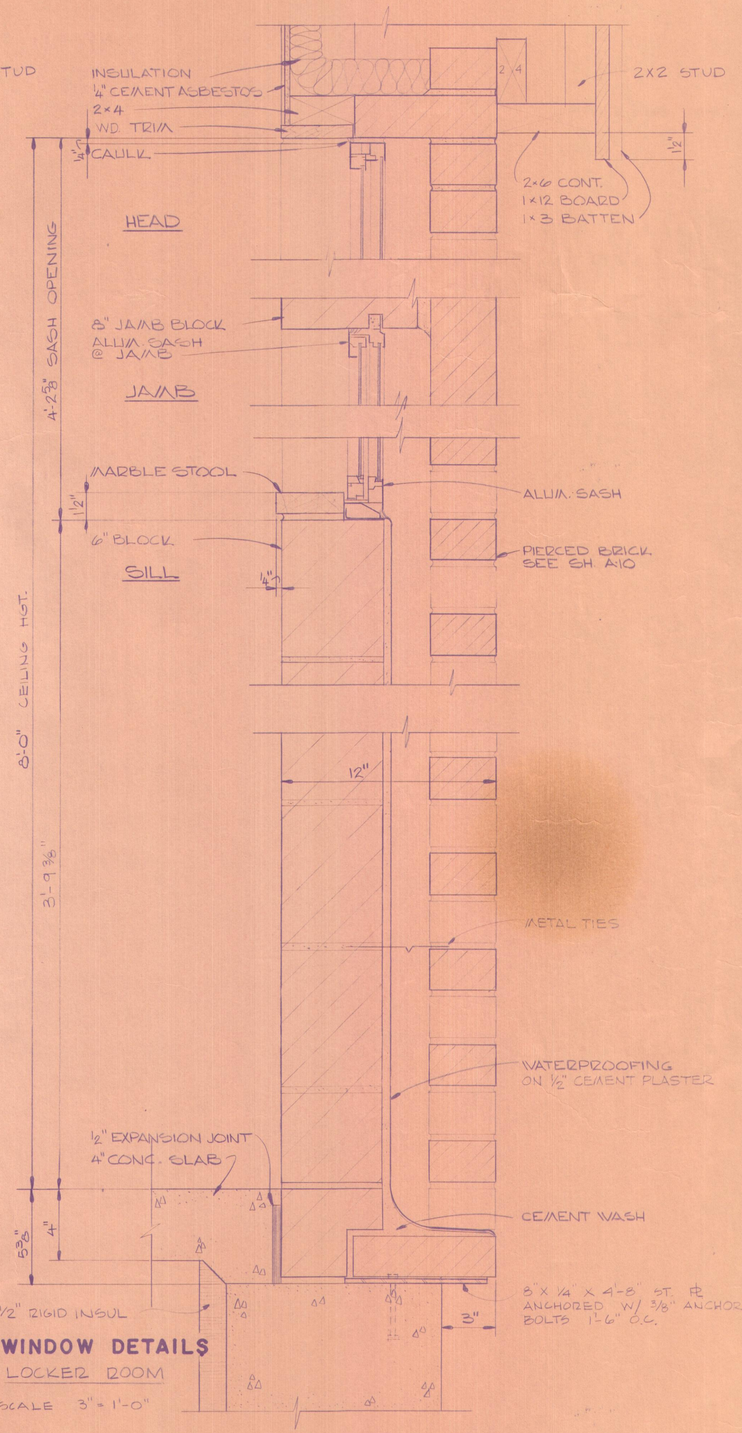
PRELIMINARY ☐
CONSTRUCTION ■
FINAL RECORD ☐

ARCHITECTS JOB NO.
826

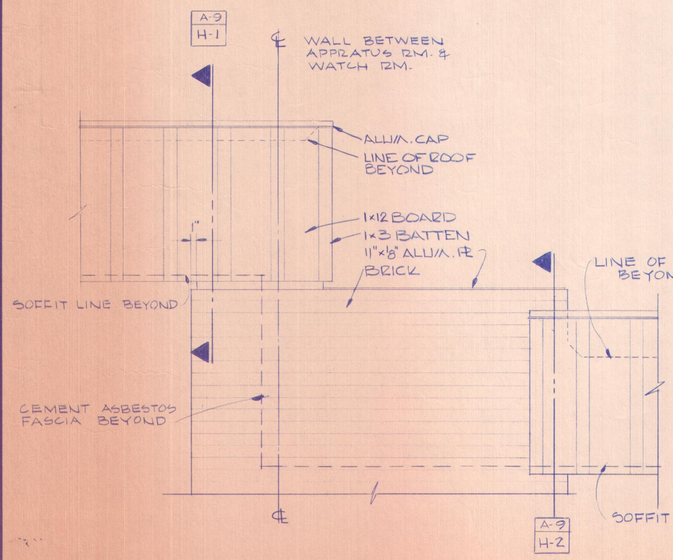
SHEET NO.
A-8



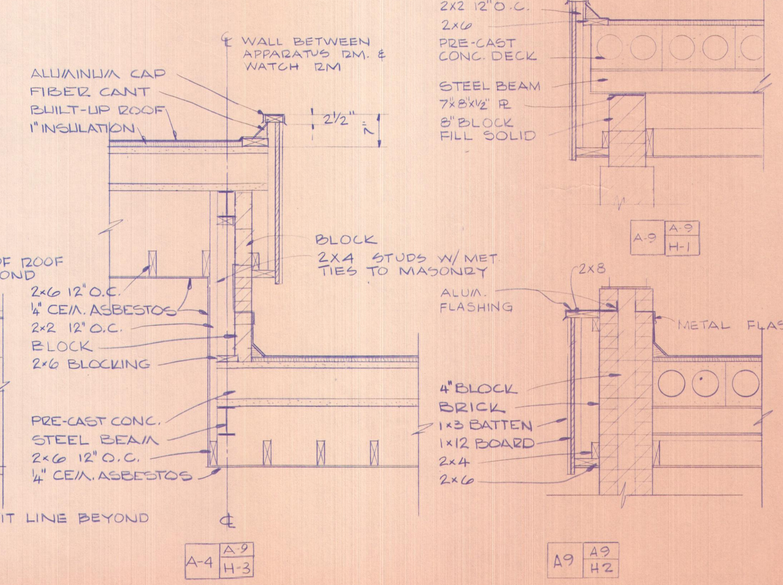
TYPICAL
WINDOW DETAILS
SCALE 3"=1'-0"



WINDOW DETAILS
LOCKER ROOM
SCALE 3"=1'-0"



ELEVATION



SECTION THROUGH SOFFIT

EXTERIOR WALL DETAILS
NORTH WALL
SCALE ¾"=1'-0"

LOCATION SHEETS — DETAIL SHEET / DETAIL NO. — ON DETAIL SHEET
DETAIL INDICATION
DETAIL SHEET / DETAIL NO. — ON LOCATION SHEET

WINDOW DETAILS
EXTERIOR WALL DETAILS

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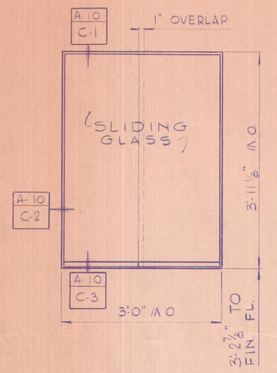
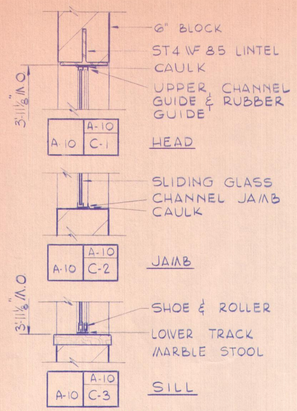
SOUTHEAST SIDE FIRE STATION
MICHIGAN
ANN ARBOR

BY
DRAWN APA
CHECKED WAP
APPROVED
REVISIONS
MARK
DATE 4-2-68
PRELIMINARY ☐
CONSTRUCTION ■
FINAL RECORD ☐
ARCHITECTS JOB NO. 826
SHEET NO. A-9

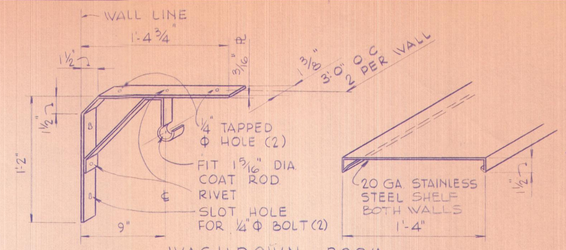


ELEVATION
SCALE: ½" = 1'-0"

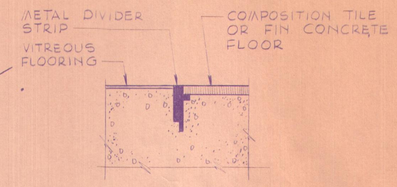


DETAILS
SCALE: 1½" = 1'-0"

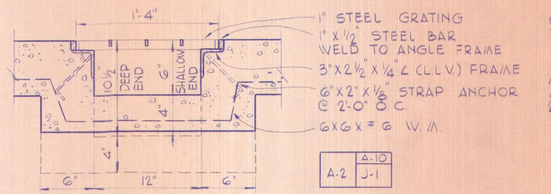
SLIDING GLASS WINDOW IN WATCH ROOM
SCALE: 1½" = 1'-0" & ½" = 1'-0"



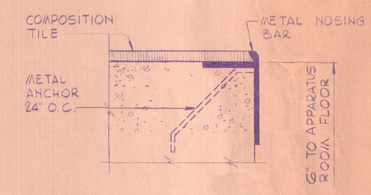
WASHDOWN ROOM
SHELF & BRACKET DETAILS
SCALE: 1½" = 1'-0"



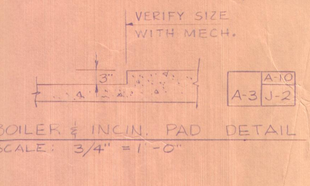
METAL DIVIDER STRIP
SCALE: FULL SIZE



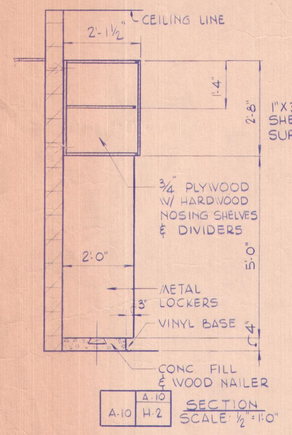
APPARATUS ROOM TRENCH
SCALE: 1½" = 1'-0"

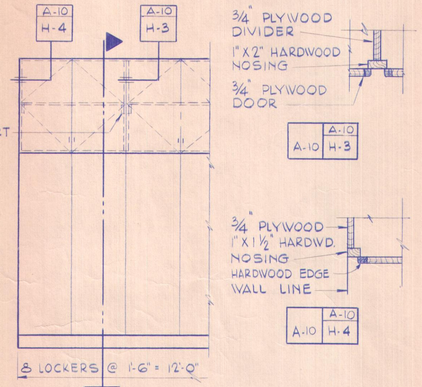


CURB NOSING DETAIL
SCALE: FULL SIZE

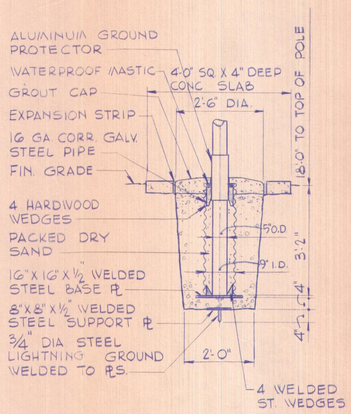


BOILER & INCIN. PAD DETAIL
SCALE: 3/4" = 1'-0"

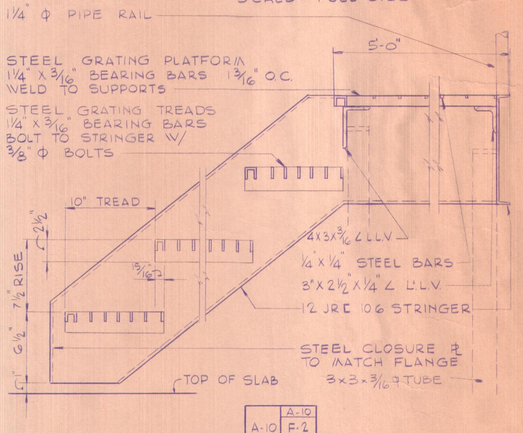




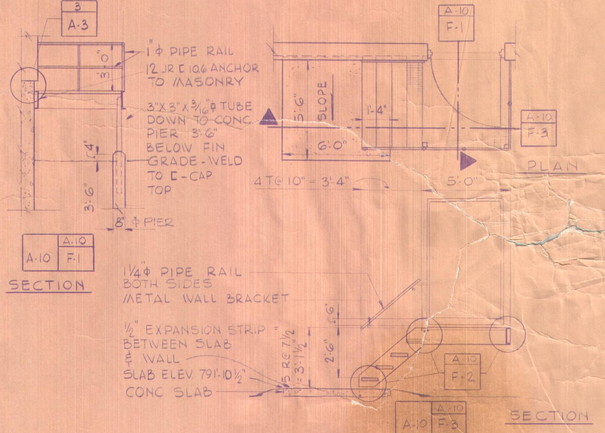
LOCKERS & STORAGE CABINETS
SCALE: ½" = 1'-0" & 1½" = 1'-0"



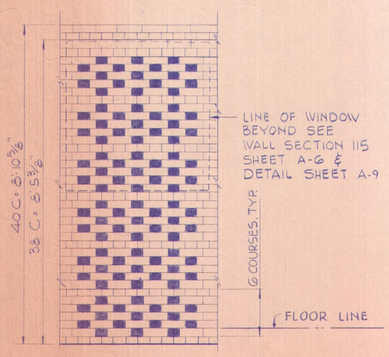
FLAGPOLE BASE
SCALE: ½" = 1'-0"



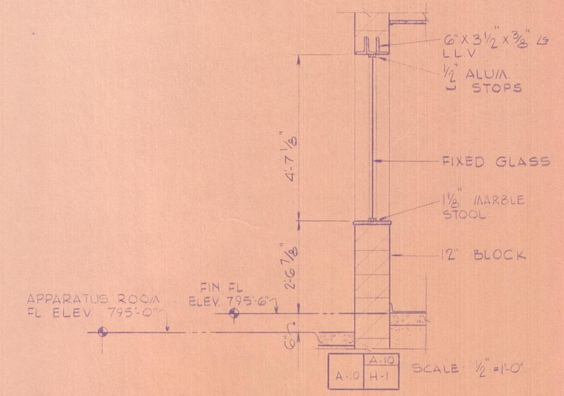
STAIR DETAILS
SCALE: 1½" = 1'-0"

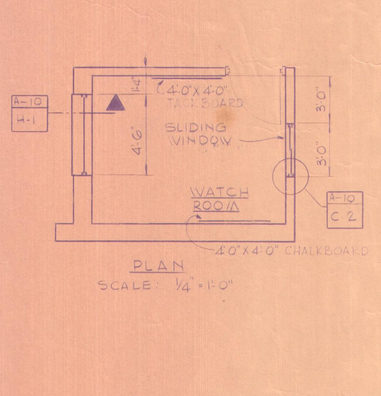


EXTERIOR STAIR DETAILS
SCALE: 1½" = 1'-0" & ¼" = 1'-0"



PARTIAL ELEVATION - PIERCED WALL @ LOCKER ROOM
SCALE: ½" = 1'-0"





WATCH ROOM DETAILS
SCALE: ½" = 1'-0" & ¼" = 1'-0"

LOCATION SHEETS — DETAIL SHEET / DETAIL NO. — ON DETAIL SHEET
DETAIL SHEET / DETAIL NO. — ON LOCATION SHEET
DETAIL INDICATION

MISCELLANEOUS DETAILS

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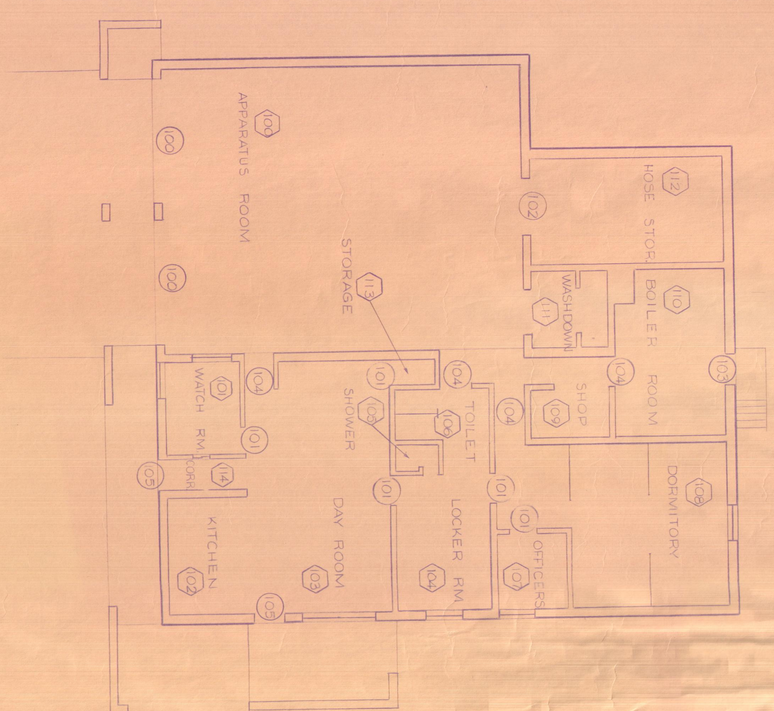
SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

DRAWN
CHECKED YAP
APPROVED
BY
REVISIONS
MARK
DATE 4-2-65
PRELIMINARY ☐
CONSTRUCTION ■
FINAL RECORD ☐
ARCHITECTS JOB NO. 826
SHEET NO. A-10



COLOR SCHEDULE

C-1

SHEET NO.

826

ARCHITECTS JOB NO.

FINAL RECORD ☐ CONSTRUCTION ☐ PRELIMINARY ■

DATE

MARK	REVISIONS	BY

DRAWN

CHECKED

APPROVED

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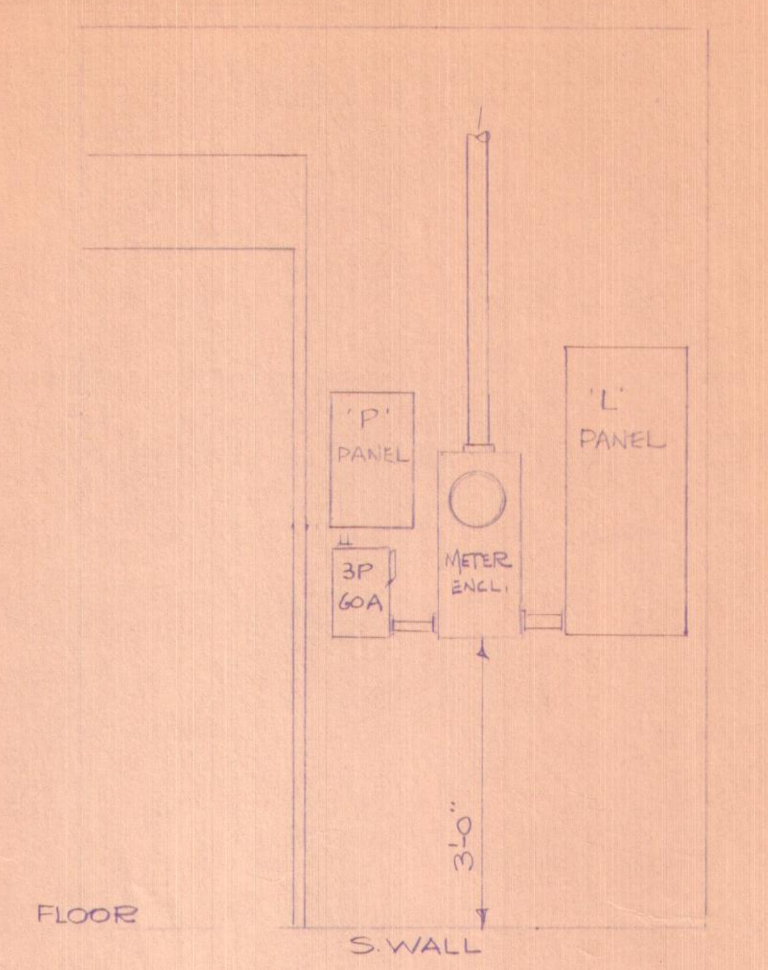
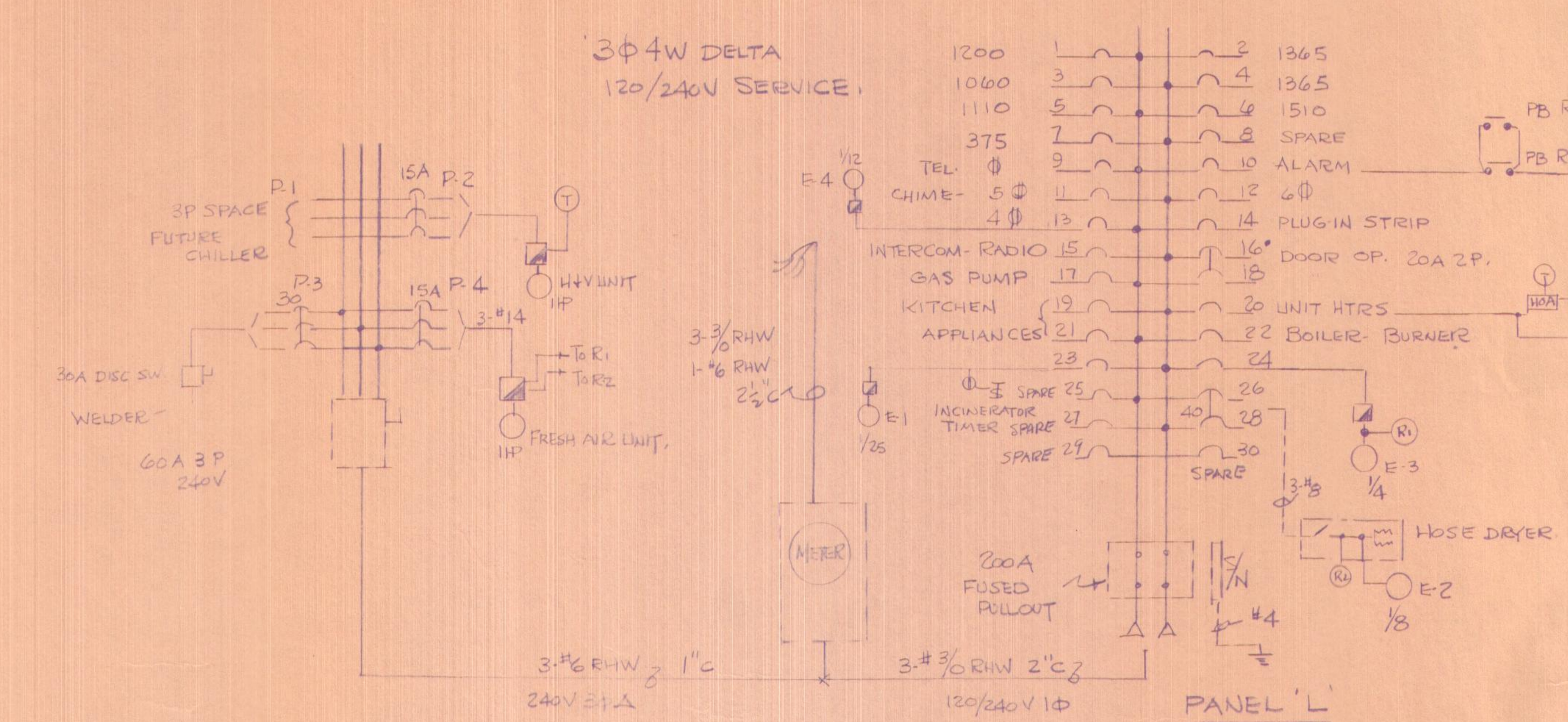
SOUTHEAST SIDE FIRE STATION

ANN ARBOR MICHIGAN

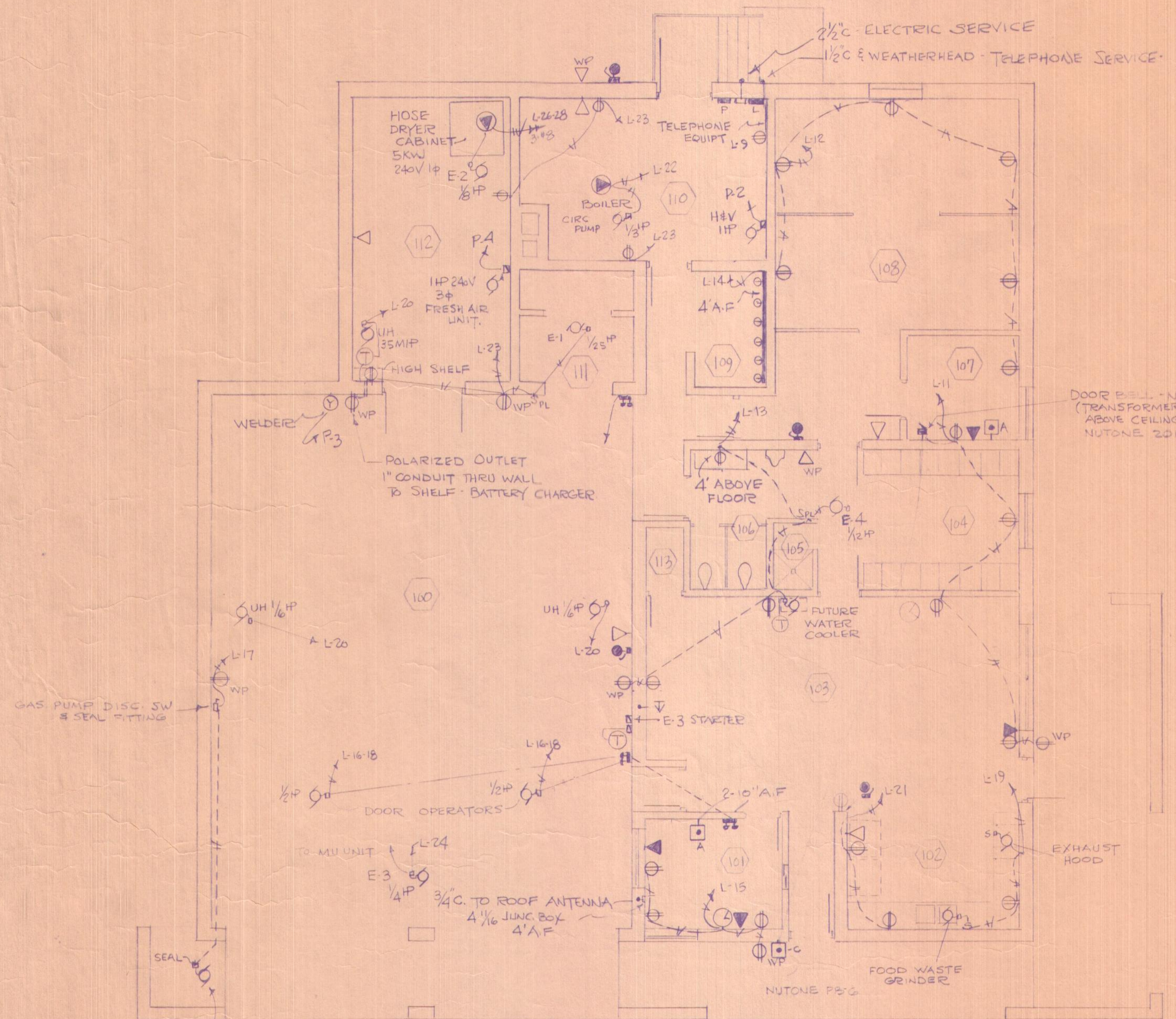


ELEVATION
SERVICE EQUIPMENT ASSEMBLY
SCALE ½" = 1'-0"



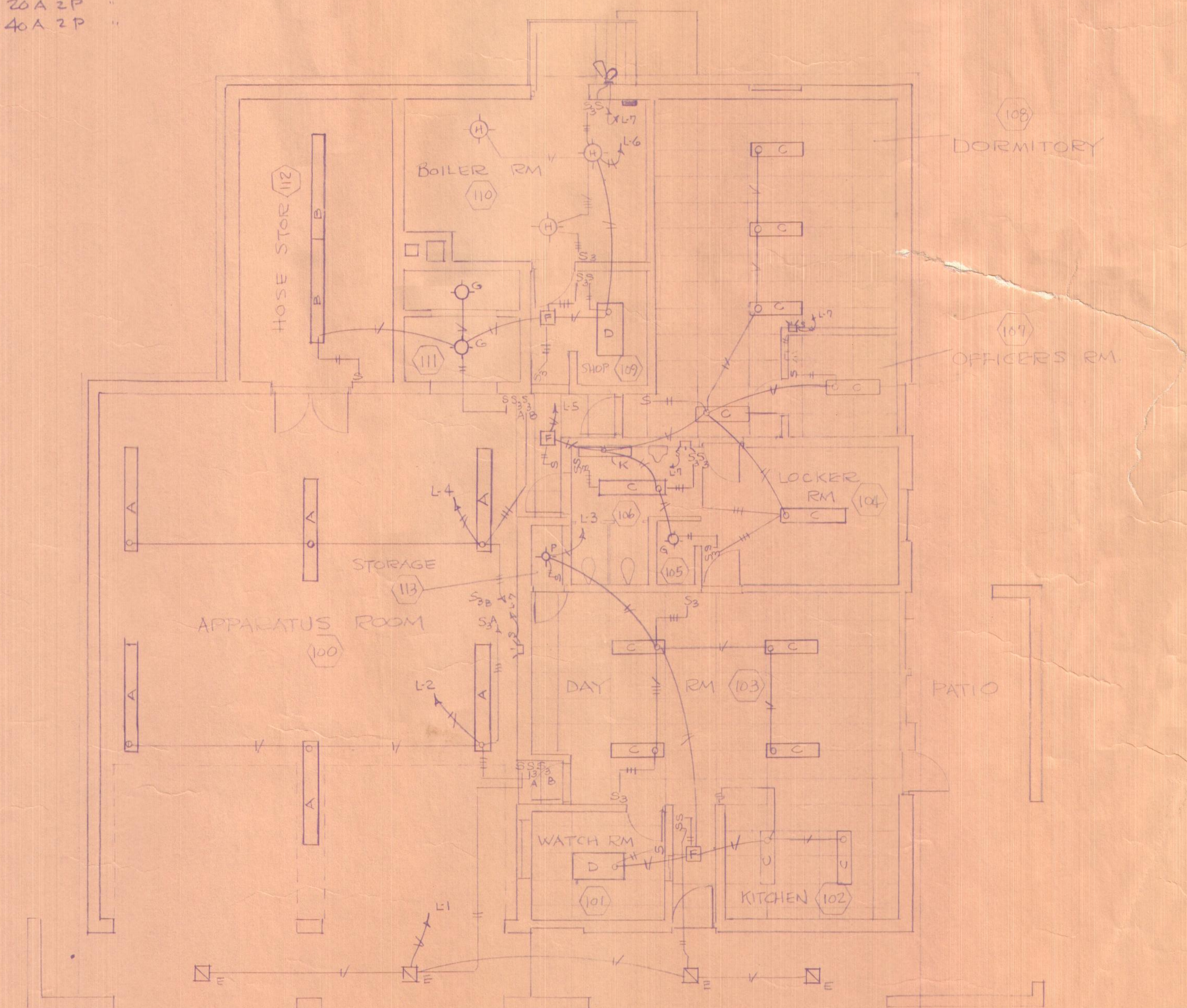
PANEL 'P'
SQ. D. QO412 3Φ 240V
125A MAINS-LUGS
2 - 15A 3P BREAKERS
1 - 30A 3P BREAKER
1 - 3P SPACE.

PANEL 'L'
SQ. D. QO30MP
200 A MAIN PULLOUT
26 - 20A 1P BREAKERS
1 - 20A 2P
1 - 40A 2P



WIRE & CONNECT ACCORDING TO ART. 514 N.E.C.

FLOOR PLAN
OUTLETS & DEVICES
SCALE ⅛" = 1'-0"



LIGHTING PLAN
SCALE ⅛" = 1'-0"

ELECTRICAL SYMBOLS

Symbol	Description
⊖	DUPLEX CONVENIENCE OUTLET
S	SINGLE POLE SWITCH
S_{PL}	SWITCH & PILOT LAMP
S_3	3-WAY SWITCH
	BRANCH CIRCUIT PANELBOARD
⊡	PUSHBUTTON ('A'-ALARM 'C'-CHIME)
	TIME SWITCH
	TELEPHONE
	CLOCK OUTLET (CLOCK BY OWNER)
	INTERCOM SPEAKER
	MOTOR & DISC SWITCH
	ALARM BELL
Ⓣ	THERMOSTAT
	MOTOR STARTER
	DOOR OPERATORS - 3 LOCATIONS
	TELEVISION OUTLET
Ⓨ	WELDER OUTLET - 220V 3Φ (VERIFY 3Φ OR 1Φ ?)
	PLUG-IN STRIP
	SPECIAL PURPOSE OUTLET
	DOOR BELL
UH	UNIT HEATER
HV	HEATING & VENT. UNIT
E-1-2-3...	EXHAUST FANS
WP	WEATHERPROOF
Ⓡ	RELAY
A F	ABOVE FLOOR

LIGHTING FIXTURE SCHEDULE

SYMBOL	MAKE-TRADE NAME-	CAT. №	MOUNTING	LAMPS
A	DAY-BRITE - LUVEX - 2PG	76278-8	8" HANGERS - R4108	2-F96PG17/CW
B	DAY-BRITE - LUVEX - 2R	R-46455	8" HANGERS - R4108	4-F40/CW
C	GUTH - LIGHTRONICS	STY 6596/BF	SURFACE - GRID CLAMP	2-F40/CW
D	GUTH - LIGHTRONICS	STY 6598 BF	SURFACE	4-F40/CW
E	BENJAMIN-MOE	M-6623/623-8/53	RECESSED	300 WATT
F	BENJAMIN-MOE	M-4080-4	SURFACE	4-40W
G	ART METAL ECONOMY DRUM	6012-562EP	SURF. EXTENSION PAN	2-75W
H	MILLER - IVANHOE - RLM DOME	AE-3011	4" OUTLET BOX MTG.	1-150W
	STEBER - 2 LAMP CLUSTER	S-5002	WALL MTD.	2-150W PAR 38 FLOODS
	HUBBELL - PORC. LAMPHOLDER	3923	4" OUTLET BOX	1-100 W.
K	DAY-BRITE - EQUALITE -	45242-4	WALL - ABOVE MIRROR	2-F40/CW
	DAY-BRITE - RECESSED NITE LITE & SW.	5085-A	WALL - 12" AB FLOOR	1-25W A-19

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

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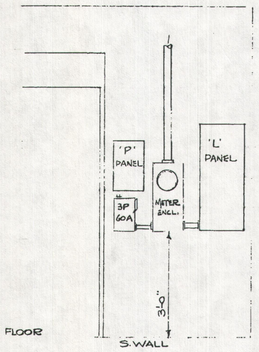
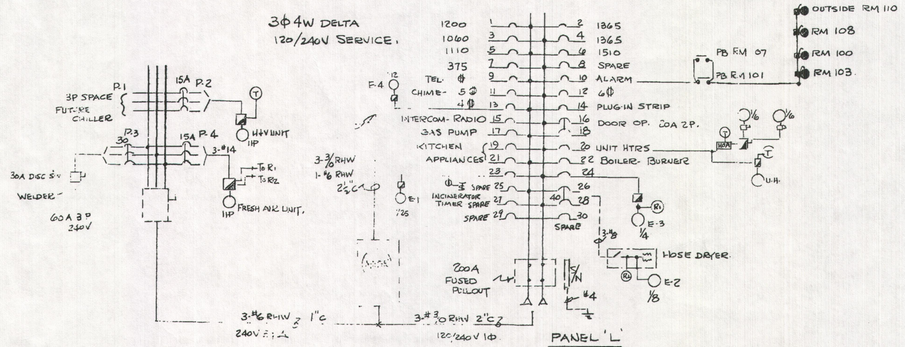
REVISIONS
PRELIMINARY ☐
CONSTRUCTION ■
FINAL RECORD ☐
ARCHITECTS JOB NO. 826

ELECTRICAL PLANS & SCHEMATICS

SHEET NO. E-1

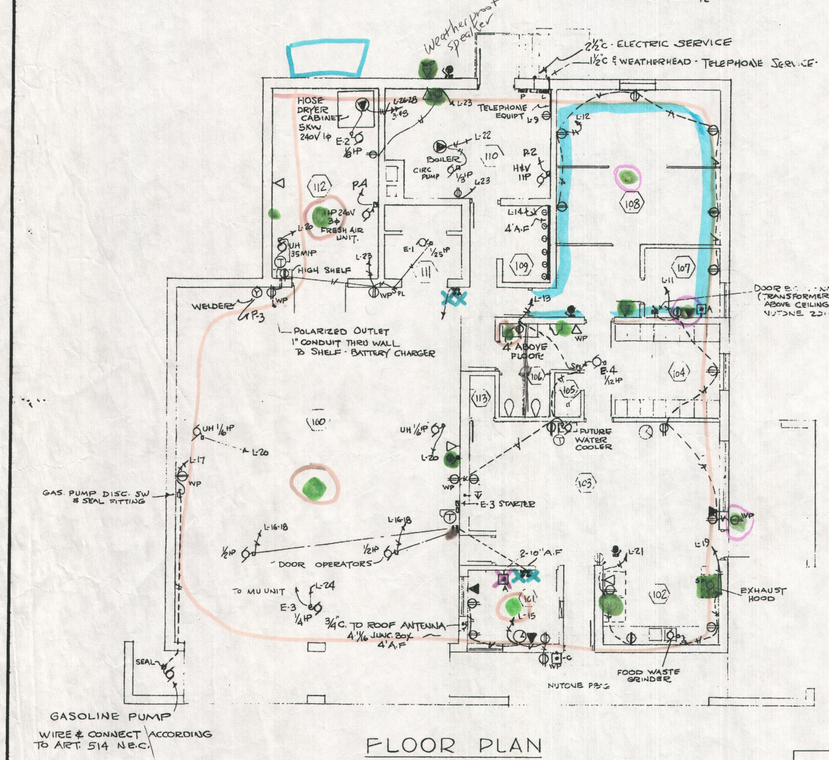


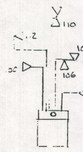
ELEVATION
SERVICE EQUIPMENT ASSEMBLY
SCALE: ½" = 1'-0"



PANEL 'P'
SQ D- QO 412 3φ 240V
125A MAINS- LUGS
2- 15A 2P BREAKERS
1- 30A 2P BREAKER
1- 3P SPACE.

PANEL 'L'
SQ. D. QO 30 MP
200 A MAIN PULLOUT
26- 20A 1P. BREAKERS
1- 20A 2P
1- 40A 2P

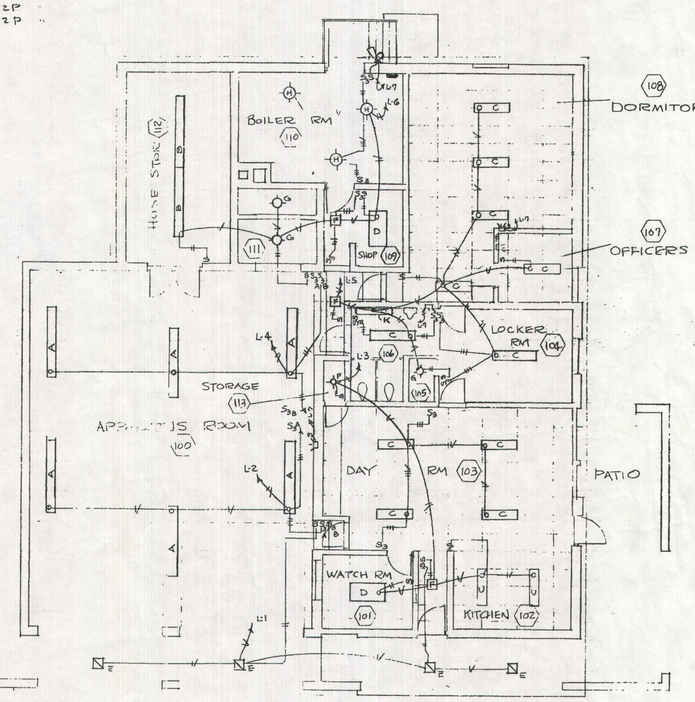




DOOR BELL TRANSFORMER (TRANSFORMER ABOVE CEILING PANEL) NUTONE 22-08 - 24 VOLTS

Stove shutoff
Generator
or Future Speaker sound sphere
Signal preempt on thermostat w/p/off
Garage door controls
Day/night switch
Zone 1 audible/light ramp control
Zone 2 Main Dorm audio/light ramp control

FLOOR PLAN
OUTLETS & DEVICES
SCALE: ⅛" = 1'-0"



LIGHTING PLAN
SCALE: ⅛" = 1'-0"

ELECTRICAL SYMBOLS

⊖	DUPLEX CONVENIENCE OUTLET
S	SINGLE POLE SWITCH S_{PL} SWITCH & PILOT LAMP
S_3	3-WAY SWITCH BRANCH CIRCUIT PANELBOARD
P	PUSHBUTTON (A-ALARM C-CHIME)
TS	TIME SWITCH
T	TELEPHONE
C	CLOCK OUTLET (CLOCK BY OWNER)
IC	INTERCOM SPEAKER
M	MOTOR & DISC SWITCH
B	ALARM BELL
T	THERMOSTAT
MS	MOTOR STARTER
D	DOOR OPERATORS - 3 LOCATIONS
TV	TELEVISION OUTLET
W	WELDER OUTLET - 220V 3φ (VERIFY 3φ OR 1φ ?)
	PLUG-IN STRIP
SP	SPECIAL PURPOSE OUTLET
DB	DOOR BELL
UH	UNIT HEATER
HV	HEATING & VENT. UNIT
E-1-3..	EXHAUST FANS
WP	WEATHERPROOF
R	RELAY
A.F	ABOVE FLOOR

LIGHTING FIXTURE SCHEDULE

SYMBOL	MAKE-TRADE NAME- CAT Nº		MOUNTING	LAMPS
A	DAY-BRITE - LUVEX-2PG	76278-8	8" HANGERS R4108	2-F96PG17/CW
B	DAY-BRITE - LUVEX-2R	R46455	5" HANGERS R4108	4-F40/CW
C	GUTH - LIGHTRONICS	STY6596/BF	SURFACE-GRID CLAMP	2-F40/CW
D	GUTH - LIGHTRONICS	STY6598-BF	SURFACE	4-F40/CW
E	BENJAMIN-MOE	M-6623/623-8/53	RECESSED	300 WATT
F	BENJAMIN-MOE	M-4080-4	SURFACE	4-40W
G	ART METAL ECONOMY DRUM	6012-562EP	SURF. EXTENSION PAN	2-75W
H	MILLER- IVANHOE- RLM DOME	AE-3011	4" OUTLET BOX MTG.	1-150W
J	STEBER- 2 LAMP CLUSTER	S-5002	WALL MTD.	2-150W PAR 38 FLOODS
K	HUBBELL- PORC. LAMPHOLDER	3923	4" OUTLET BOX	1-100 W.
R	DAY-BRITE - EQUALITE -	45242-4	WALL ABOVE MIRROR	2-F40/CW
	DAY-BRITE - RECESSED NITE LITE & SW.	5035-A	WALL 12" AB FLOOR	1-25W A-19.

ELECTRICAL PLANS & SCHEMATICS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR
MICHIGAN

LANE, RIEBE, WEILAND • ARCHITECTS
3366 WASHTENAW ROAD • ANN ARBOR, MICHIGAN, 48104 • TELEPHONE 313-663-0566

DRAWN LDS
CHECKED
APPROVED

BY | REVISIONS | MARK | DATE

DATE 4-2-65
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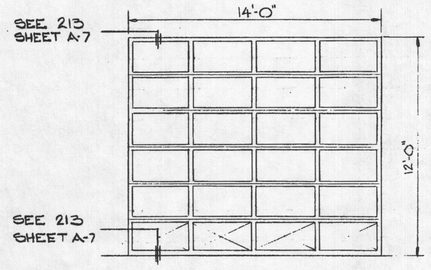
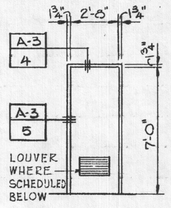
CONSTRUCTION ■
FINAL RECORD ☐

ARCHITECTS JOB NO. 826

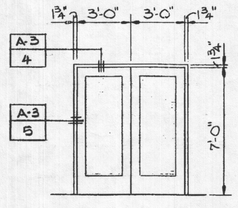
SHEET NO. E-1



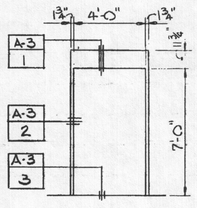
(100) ALUMINUM DOOR 3/16" GLASS PANELS DOUBLE ALUM. KICK PANELS



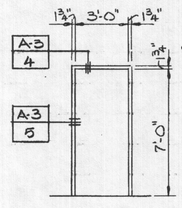
(101) H.M. DOOR & FRAME LOUVERS BET. RM'S 103 & 104 - 2½" MIN. CLEAR AREA 103 & 101, 107 & 108 1" MIN. CLEAR AREA



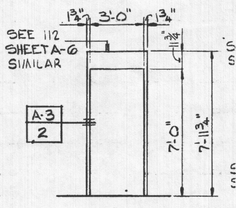
(102) H.M. DOOR & FRAME METAL LOUVER



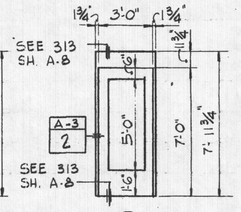
(103) H.M. DOOR & FRAME ALUM. THRESHOLD



(104) H.M. DOOR & FRAME



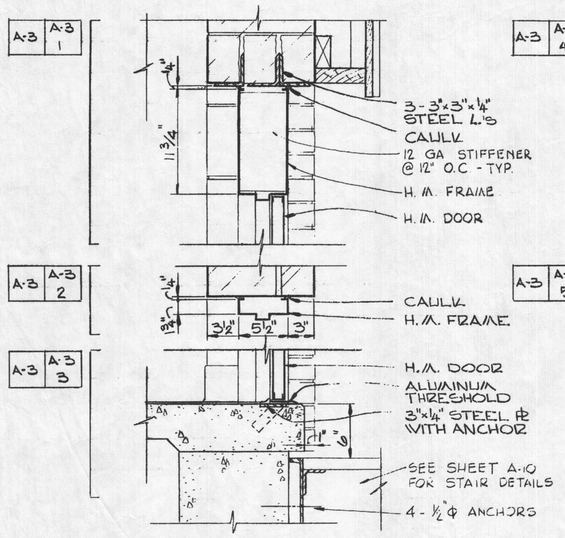
(105) H.M. DOOR & FRAME ALUM. TRESHOLD



(106) H.M. DOOR & FRAME ALUM. THRESHOLD ¼" ϕ GLASS

NOTES:

1. APPARATUS ROOM - PROVIDE METAL DIVIDER STRIP @ DOOR 102 AS PART OF ALT. #1.
2. ALT #2 - LIGHT LINE INDICATES EXTENT OF VITREOUS WALL SURFACING.
3. FLOOR - ASPHALT TILE W/ METAL EDGE STRIP - SEE SHEET A-10 FOR DETAIL.
4. FOR ELEVATIONS OF LOCKER ROOM & KITCHEN SEE SHEET A-5
5. PROVIDE STORAGE CABINETS ABOVE LOCKERS SEE SHEET A-10 FOR DETAILS
6. PROVIDE METAL SHELVING IN WASHDOWN ROOM. SEE DETAIL SHEET A-10.
7. INSTALL 1-12"X12" FLUE & 1-8"X8" FLUE AT CHIMNEY PROVIDE METAL CLEAN OUT DOOR AT BASE OF EACH FLUE



DOOR ELEVATION

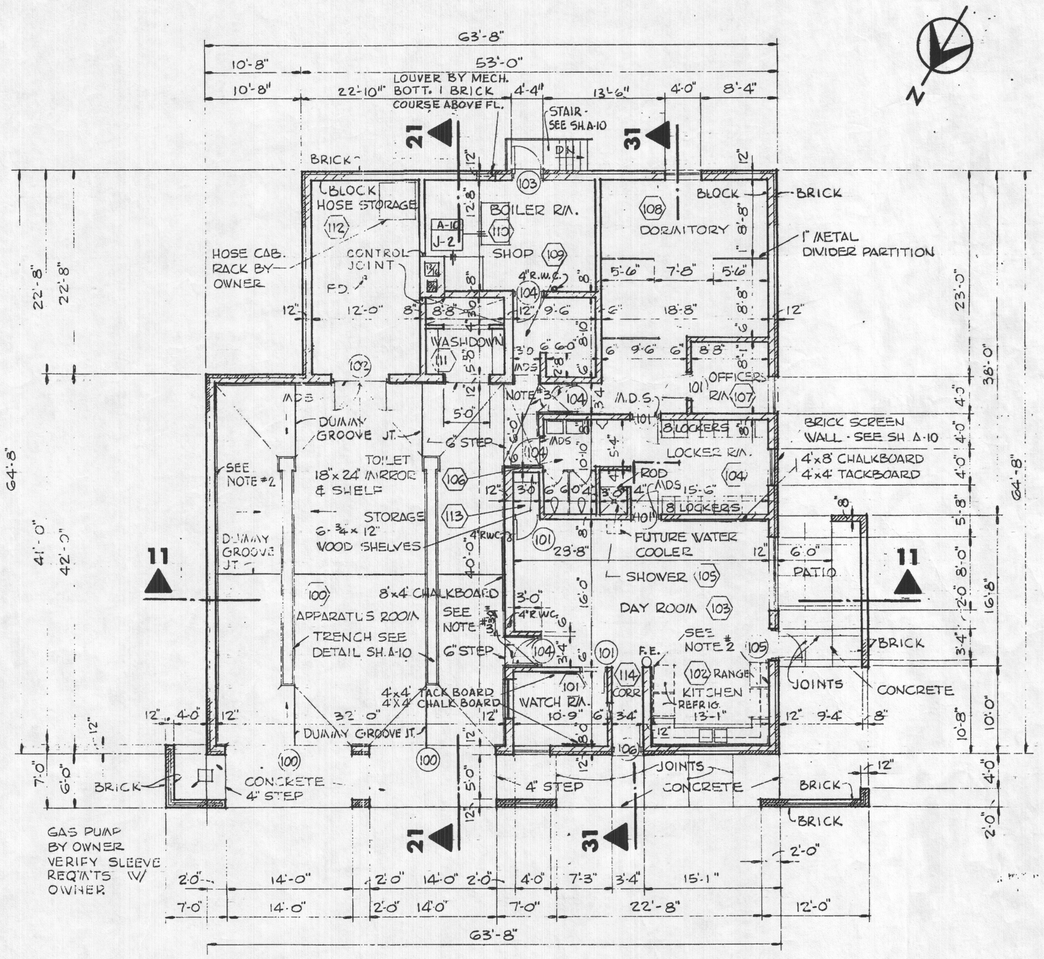
SCALE 1/4"=1'-0"

DOOR DETAILS

SCALE 1½"=1'-0"

FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR: ASPHALT TILE	FLOOR: VITREOUS FL.	FLOOR: CONC. SEALED	BASE: 4" VINYL	BASE: CERAMIC TILE	BASE: NONE	WALLS MAT'L: BLOCK 6'-0" CERAMIC TILE	WALLS FINISH: PAINTED	WALLS FINISH: VITREOUS	WALLS FINISH: NONE	CEILING MAT'L: EXPOSED	CEILING MAT'L: LAY-IN PANELS	CEILING FINISH: PAINTED	CEILING FINISH: NONE	CEILING HEIGHT	REMARKS	ALTERNATES A1: VITREOUS TROWELED FLOORING	ALTERNATES A2: VITREOUS WALL SURFACE
		-	2	3	-	2	3	-	1	2	3	-	2	-	2			1	2
100	APPARATUS			3				-				-	2	-	2	13'-7⅜"	CHALK BD.	1	2
101	WATCH	1				1		-		1			2		2	8'-0"			
102	KITCHEN	1				1		-		1			2		2	8'-0"			2
103	DAY ROOM	1				1		-		1			2		2	8'-0"	CHALK & TACK BD.		
104	LOCKER		2			1		-			2	-			2	9'-1⅜"	MILLWORK		
105	SHOWER		2				2	-	2	1		-			2	9'-1⅜"	CURTAIN ROD		
106	TOILET		2			1		-		2		-			2	9'-1⅜"	MET. PART'NS - MIRR. - SHELF		
107	OFFICERS	1				1		-		1			2		2	8'-0"			
108	DORMITORY	1				1		-		1			2		2	8'-0"	MET. DIVIDING PART'NS		
109	SHOP			3			3	-		1		-		1		9'-1⅜"			
110	BOILER RM.			3			3	-		1		-		2		9'-1⅜"			
111	WASHDOWN		2			2		-		2		-		1		9'-1⅜"			
112	HOSE STOR			3			3	-		1		-		1		9'-7⅜"			
113	STORAGE	1			1			-		1		-		2		9'-1⅜"			
114	CORRIDOR	1			1			-		1			2		2	8'-0"			



DETAIL SHEET / DETAIL NO. / ON LOCATION SHEET

LOCATION SHEETS — DETAIL SHEET / DETAIL NO. / ON DETAIL SHEET

DETAIL INDICATION

FIRST FLOOR PLAN

SCALE 1/8" = 1'-0"

FIRST FLOOR PLAN
FINISH SCHEDULE
DOORS & DETAILS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

LANE, RIEBE, WEILAND • ARCHITECTS
3366 WASHTENAW ROAD • ANN ARBOR, MICHIGAN, 48104 • TELEPHONE 313-663-0586

DRAWN WAP/ABA CHECKED WAP APPROVED

BY

REVISIONS

MARK

DATE 4-2-65

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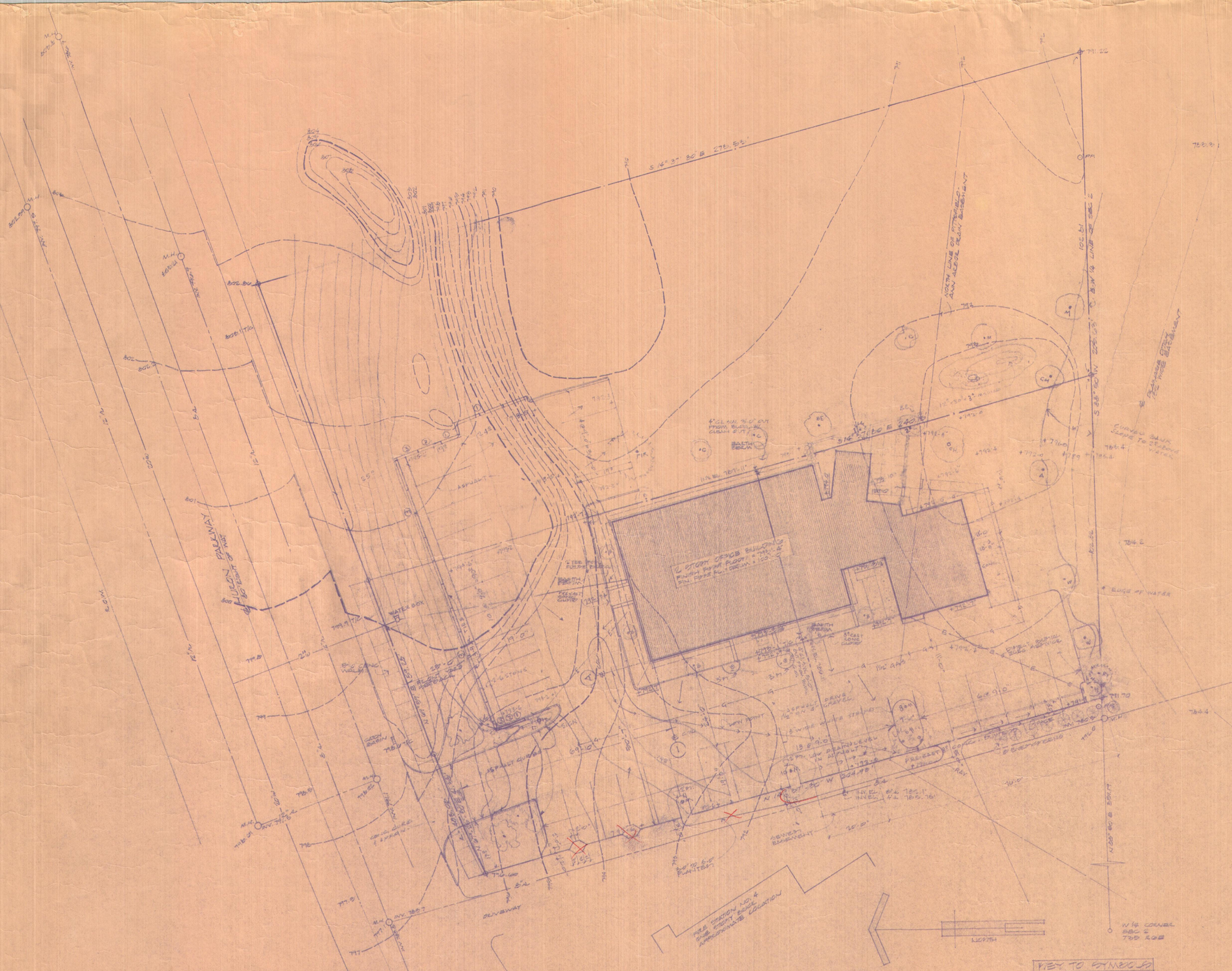
ARCHITECTS JOB NO. 826

SHEET NO. A-3



SITE DEVELOPMENT PLAN

SCALE 1" = 16'-0"

INFORMATION ON EXISTING PROPERTY INCLUDING UTILITIES, EXISTING ELEVATIONS, & PROPERTY DESCRIPTION SUPPLIED BY [illegible] INC. ANN ARBOR, MICH. REFERENCE [illegible] DRAWING NO. [illegible] JOB NO. 25020, 7-16-68

[illegible] REQUIRED, [illegible] CARS PARKED

KEY TO SYMBOLS

798.5 EXISTING POINT ELEVATION
+792'7" NEW ELEVATION
EXISTING CONTOUR
NEW CONTOUR
—R— STORM SEWER
—S— SANITARY SEWER
→ DIRECTION OF PITCH
T/C, G TOP OF CURB, GUTTER
—W— WATER SERVICE
WILLOW
M MAPLE, CHERRY, ETC.
C-CRAB
B-BIRCH
FIR
CAMPERDOWN ELM

DRAWINGS INDEX

ARCHITECTURAL

COVER SHEET
1. SITE DEVELOPMENT PLAN
2. FIRST FLOOR PLAN
3. SECOND FLOOR PLAN
4. NORTH & WEST ELEVATIONS
5. SOUTH & EAST ELEVATIONS
6. BUILDING SECTIONS
7. WALL SECTIONS & DETAILS
8. INTERIOR & EXTERIOR DETAILS
9. TYPICAL APARTMENT EXTERIOR DETAILS

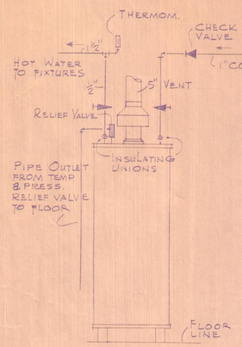
STRUCTURAL

S-1. FOUNDATION PLAN & DETAILS
S-2. SECOND FLOOR & APT. ROOF FRAMING
S-3. OFFICE ROOF FRAMING PLAN

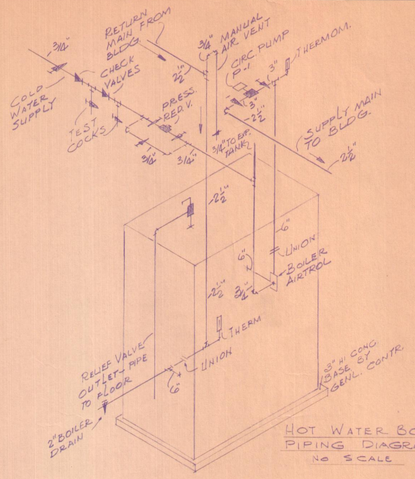
REV. MARCH 5 1969 SH.
1, 2, 3, 4, 6 10, MP-1, E-1, E-2

REV. JULY 8, 1969 STATION PLANTER
REV. JULY 2 69 PARKING & PLANTING
REV. JUNE [illegible] LANDSCAPE WORK
REV. APRIL 14 69 DRIVES, PARKING, TREES
REV. MAR. 10 69 BLDG. SIGN
FEB. 20 69 FOR CONSTRUCTION
REV FEB. 1, 69 GAS & ELEC. SERVICE
JAN. 2 69 - NO CHANGE
REV. NOV. 22 68 - PARKING & WALKS

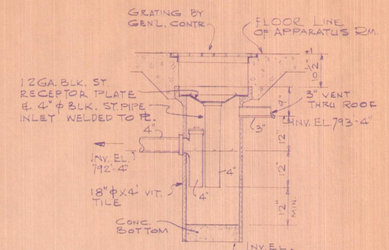
SITE DEVELOPMENT PLAN — 1" = 16'-0"
LIVINGSTON OFFICE PLAZA — HURON PARKWAY ANN ARBOR, MICHIGAN
JOB NO. 6816
DATE NOV 15 1968
DR. dhl
CH.
JAMES H. LIVINGSTON, ASSOCIATES
ARCHITECTS
ANN ARBOR, MICHIGAN
SHEET NO. 1



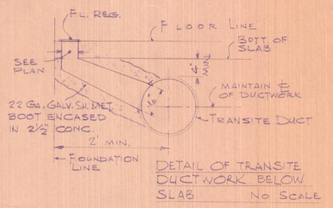
PIPING DIAGRAM
FOR HOT WATER HEATER
NO SCALE
(GAS FIRED HEATER)



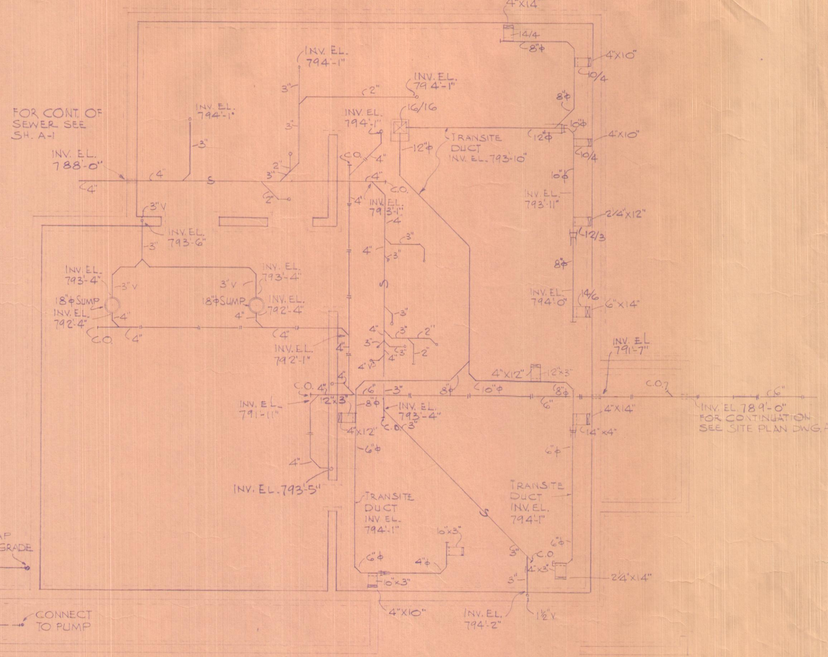
HOT WATER BOILER
PIPING DIAGRAM
No SCALE

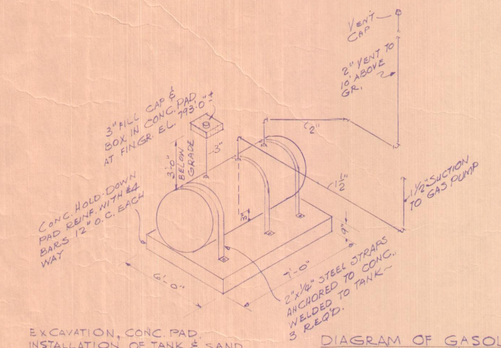


APPARATUS ROOM
SUMP DETAIL
NO SCALE



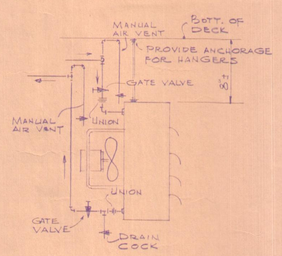
DETAIL OF TRANSITE
DUCTWORK BELOW
SLAB No Scale



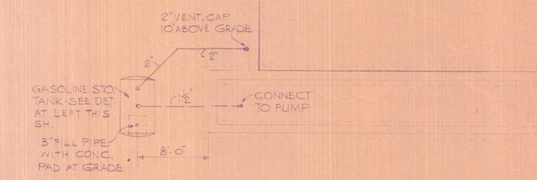


EXCAVATION, CONC. PAD
INSTALLATION OF TANK & SAND
BACK FILL BY MECH. CONTR.

DIAGRAM OF GASOLINE
STORAGE TANK & PIPING
NO SCALE



PIPING DIAGRAM
FOR HOT WATER UNIT
HEATERS No SCALE



FOUNDATION PLAN
SCALE: ⅛"=1'-0"

PIPING SYMBOLS

SANITARY SEWER ——S——S——
STORM WATER SEWER ——ST——ST——
HOT WATER HEATING SUPPLY ——→——
HOT WATER HEATING RETURN ——←——
GAS PIPING OR GAS SERVICE ——G——G——
COLD WATER OR WATER SERVICE ——W——W——
DOMESTIC HOT WATER ——HW——HW——
TRANSITE DUCTWORK
R.W.C. RAIN WATER CONDUCTOR
F.D. FLOOR DRAIN
WALL HYD. WALL HYDRANT
H.B. HOSE BIBB
Ⓣ THERMOSTAT
R. RISER
V VENT

PLUMBING & HEATING
FOUNDATION PLAN & DETAILS

SOUTHEAST SIDE FIRE STATION
ANN ARBOR MICHIGAN

LANE, RIEBE, WEILAND - ARCHITECTS
3366 WASHTENAW ROAD - ANN ARBOR, MICHIGAN, 48104 - TELEPHONE 313-663-0586

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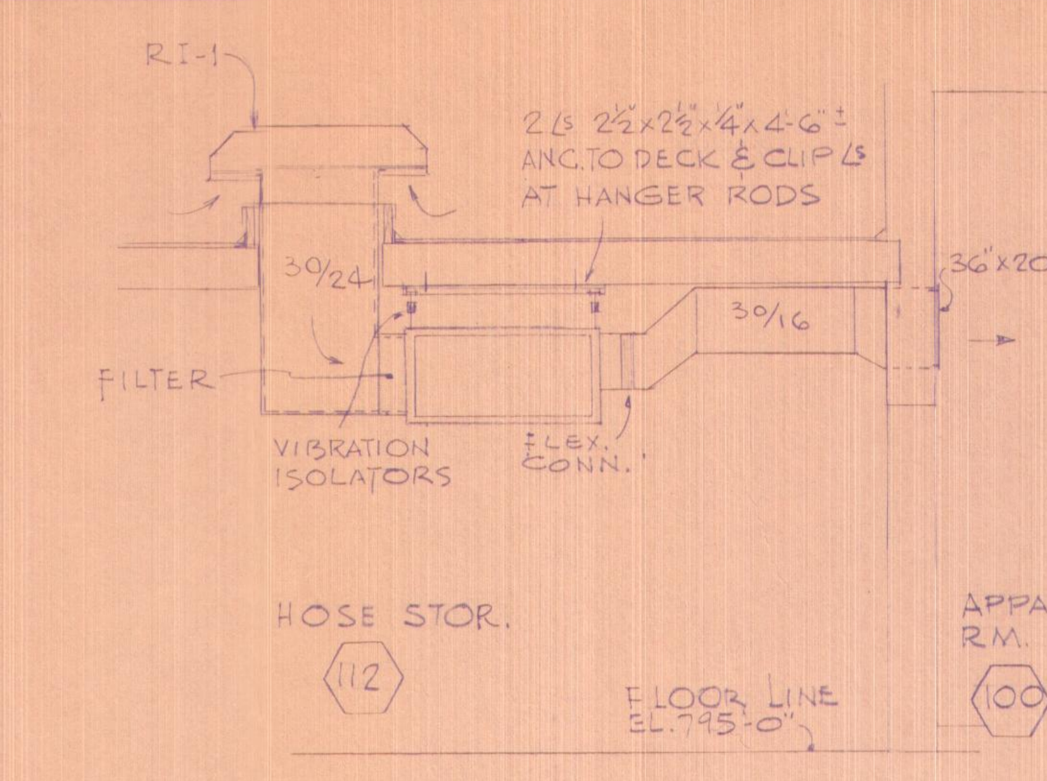
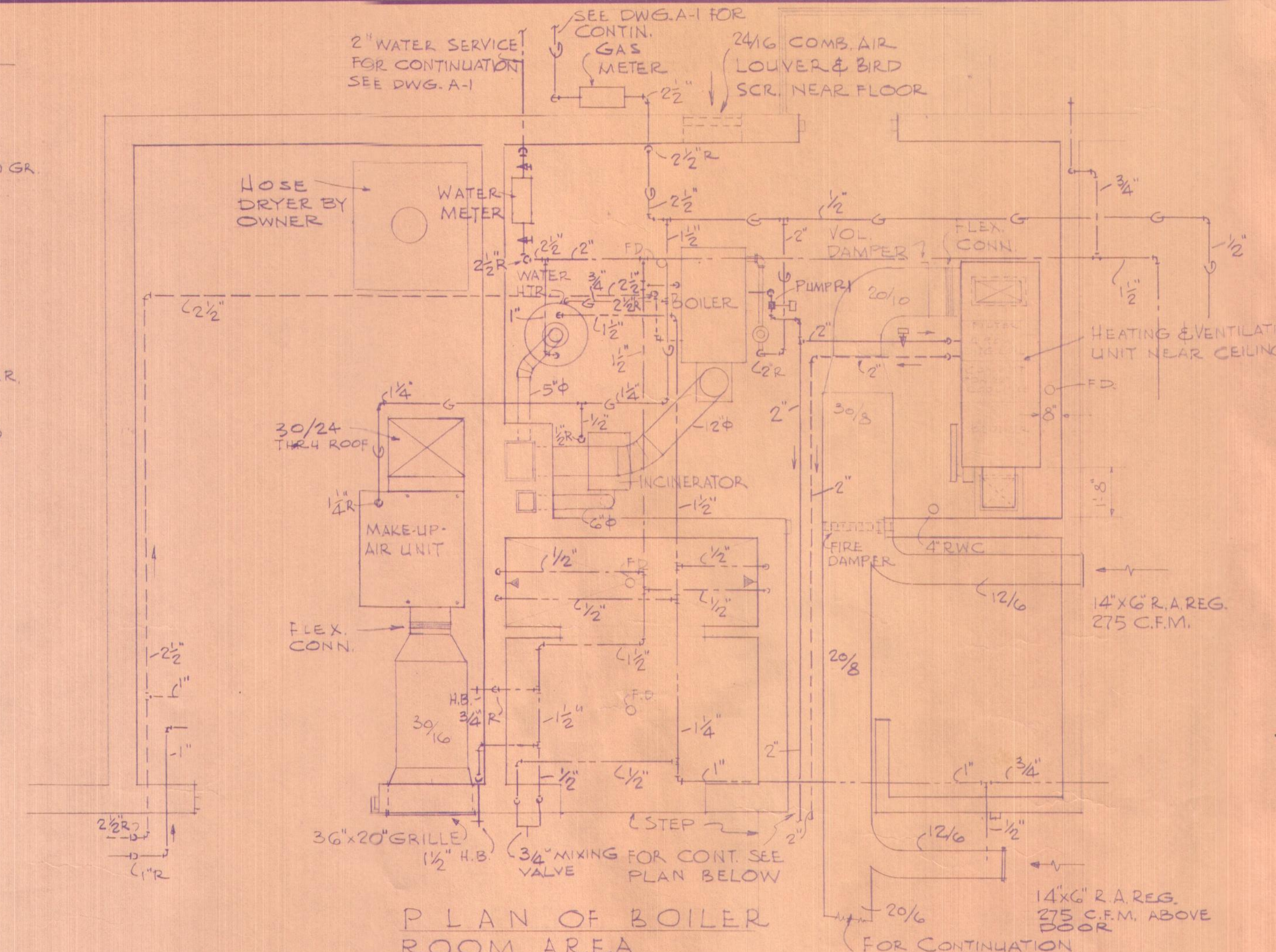
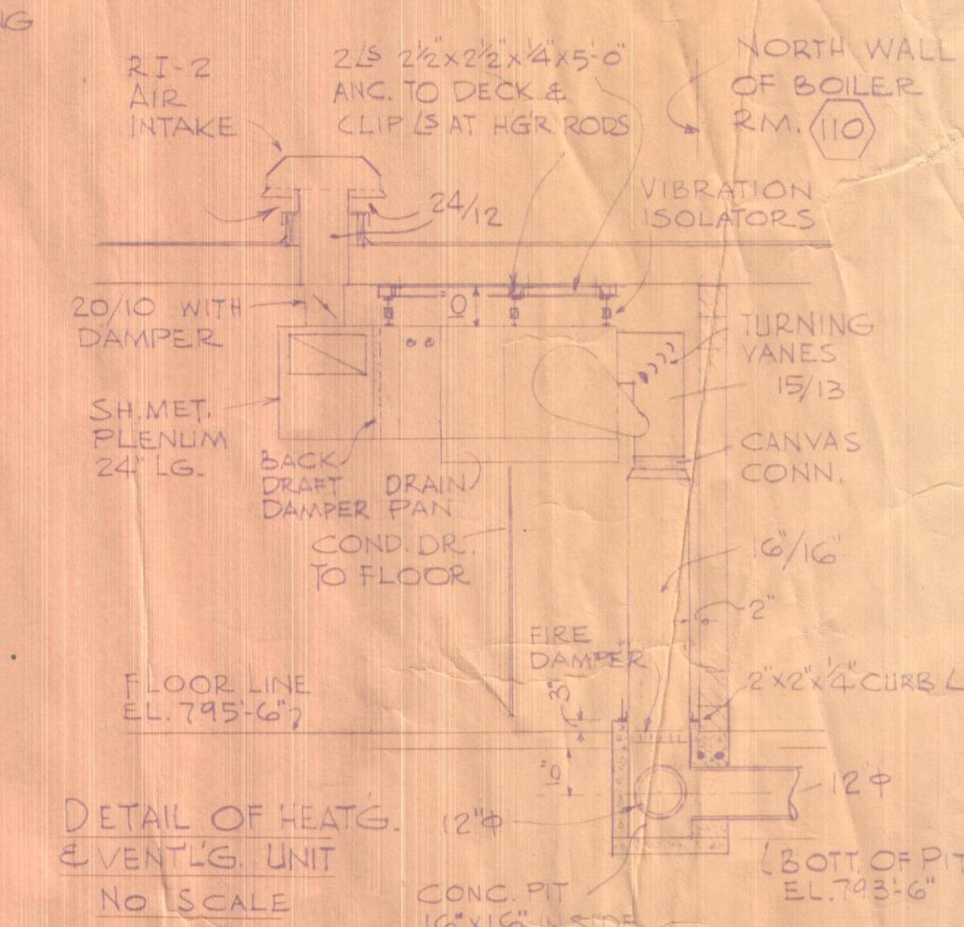
SHEET NO. M-1



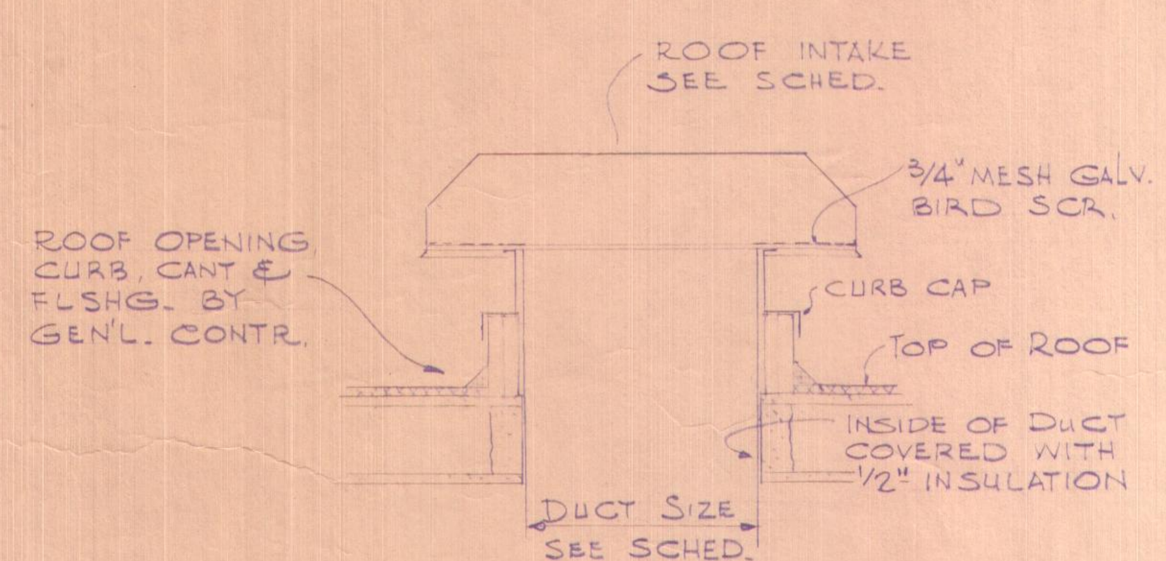
DETAIL OF MAKE-UP AIR UNIT NO SCALE



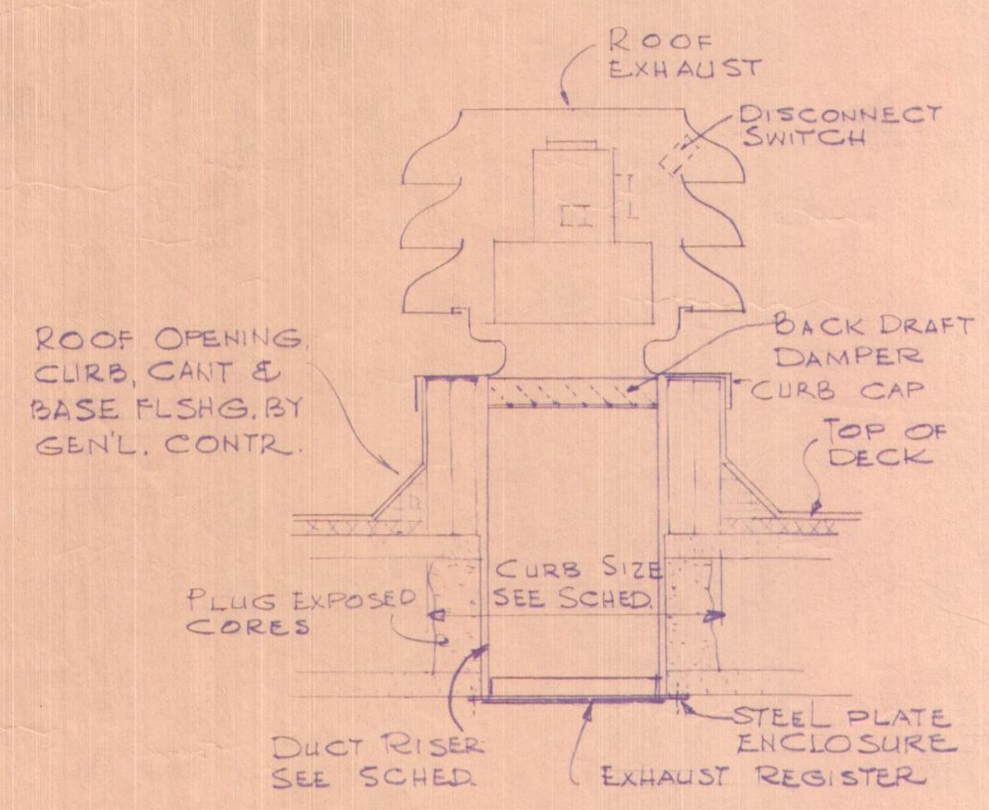
PLAN OF BOILER ROOM AREA
SCALE: ¼"=1'-0"



DETAIL OF HEAT'G. & VENT'G. UNIT NO SCALE

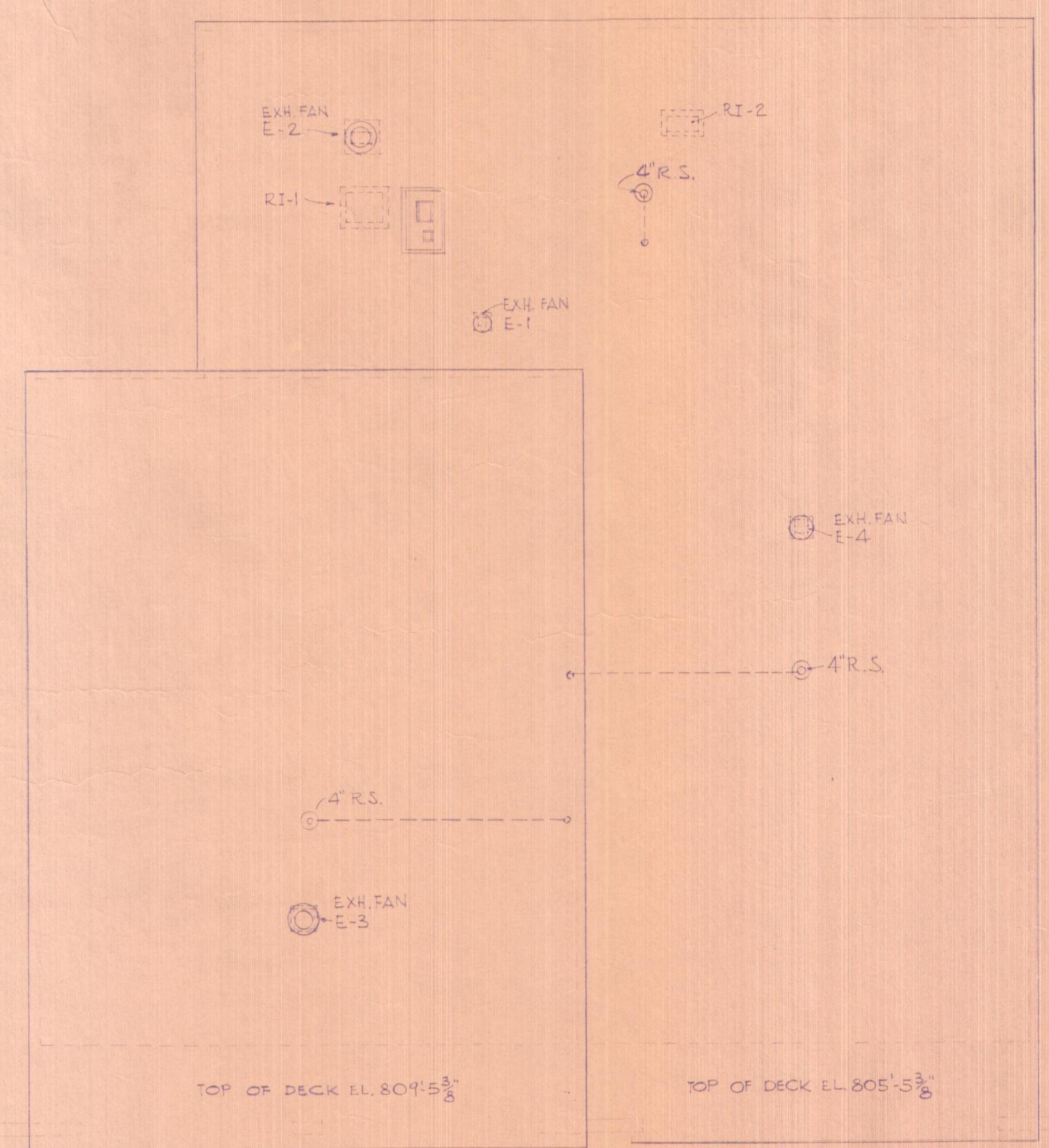


DETAIL OF ROOF AIR INTAKE HOOD NO SCALE

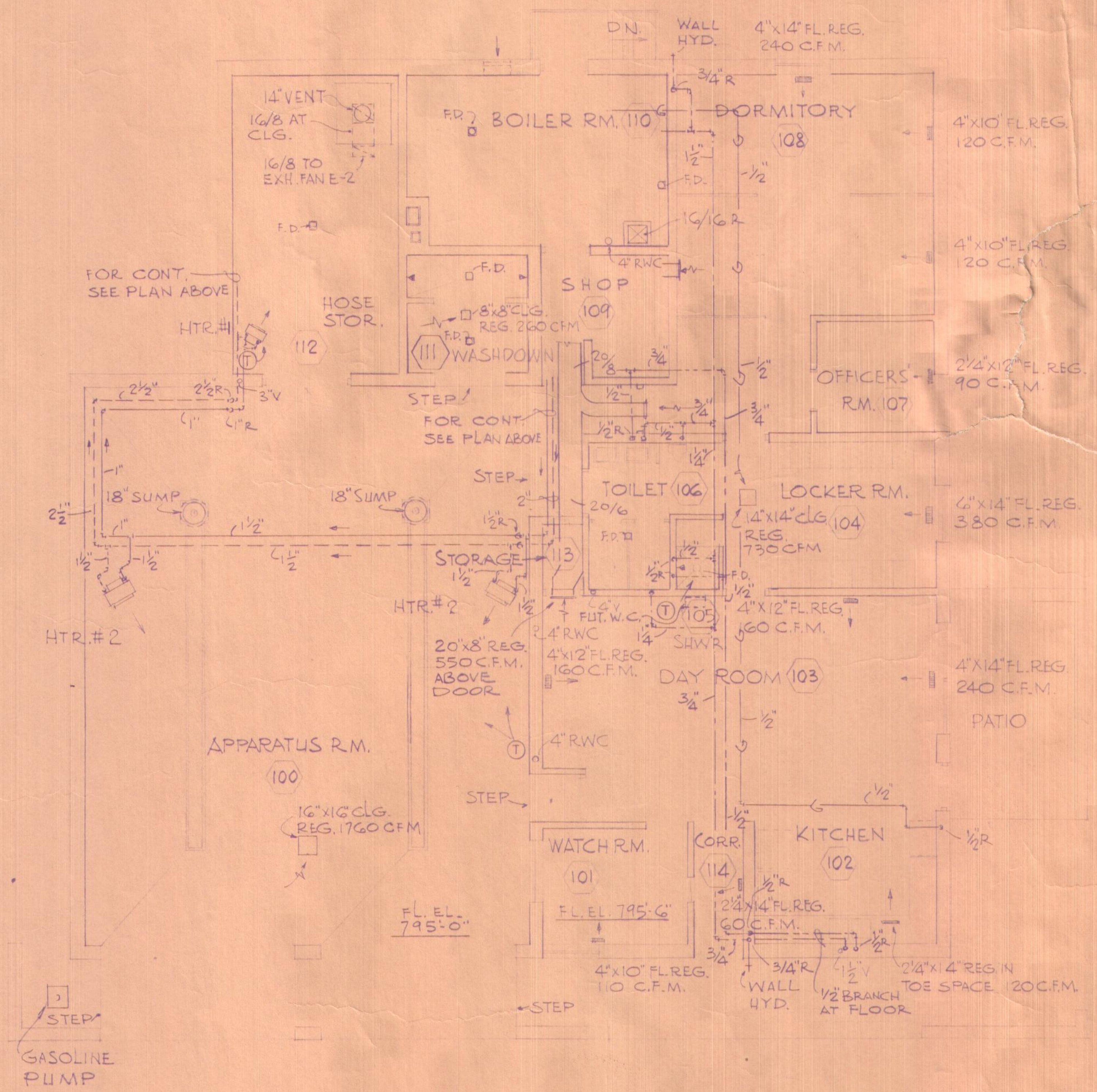


DETAIL OF EXHAUST FAN NO SCALE

SCHEDULE OF ROOF AIR INTAKE HOODS			
NO.	INTAKE HOOD FOR	DUCT SIZE	CURB SIZE
RI-1	MAKE-UP AIR UNIT	24"x30"	32"x38"
RI-2	HEAT & VENT UNIT	12"x24"	20"x32"



ROOF PLAN
SCALE: ⅛"=1'-0"



FIRST FLOOR PLAN
SCALE: ⅛"=1'-0"

SCHEDULE OF EXHAUST FANS									
UNIT NO	LOCATION	CFM STD AIR	STATIC PRESS	FAN RPM	MOTOR H.P.	BACK DRAFT DAMPER	CURB SIZE	TYPE & MODEL NO	TYPE OF CONTROL
E-1	WASHDOWN RM. 111	260	1/16"	1550	1/25	6½x6½	14½x14½	TCD #7C15D	MANUAL
E-2	HOSE DRYER CABINET-RM. 112	980	3/16"	1140	1/8	19½x19½	27½x27½	QT #16Q11	INTERLOCK WITH MAKEUP UNIT
E-3	APPARATUS ROOM 100	1760	1/16"	1140	1/4	12½x12½	20½x20½	TCD #15C11D	INTERLOCK WITH MAKEUP UNIT
E-4	TOILET & LOCKER RM. 104	730	1/16"	860	1/12	10½x10½	18½x18½	TCD #13C8D	MANUAL

PLUMBING & HEATING FLOOR PLAN & DETAILS

SOUTHEAST SIDE FIRE STATION
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DRAWN F.G.
CHECKED W.F.B.
APPROVED

MARK	REVISIONS	BY

DATE 4-2-65
PRELIMINARY ☐
CONSTRUCTION ■
FINAL RECORD ☐

ARCHITECTS JOB NO. 826

SHEET NO. M-2