

RFB NO. 316058



CONSTRUCTION DOCUMENTS PROJECT MANUAL

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY AND TRANSPORTATION

PUBLIC WORKS DIVISION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WISCONSIN 53713

REQUEST FOR BIDS NO. 316058
SCHUMACHER BARN REMODEL/SITE IMPROVEMENTS
SCHUMACHER FARM COUNTY PARK
5682 WI-19
WAUNAKEE, WISCONSIN 53597

Due Date / Time: **TUESDAY, JUNE 6, 2017 / 2:00 P.M.**

Location: **PUBLIC WORKS OFFICE**

Performance / Payment Bond: **100% OF CONTRACT AMOUNT**

Bid Deposit: **5% OF BID AMOUNT**

FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

J. Eric Urtes, AIA – Project Manager or Ryan Shore, CPESC - Project Manager

Telephone No.: 608/266-4798 (Eric) or 608/266-4475 (Ryan)

Fax No.: 608/267-1533

e-mail: urtes.eric@countyofdane.com or shore@countyofdane.com

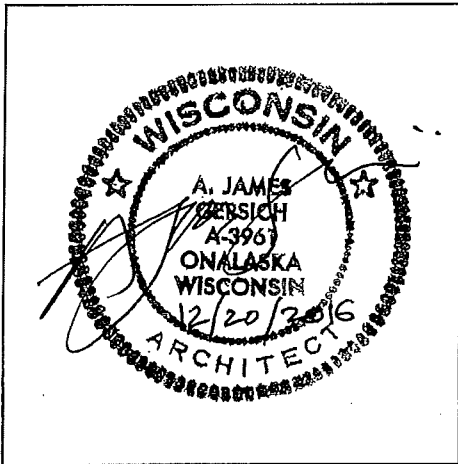
SEALS PAGE

BID NO. 316058

PROJECT: SCHUMACHER FARM CO. PARK

ARCHITECT

I hereby certify that this drawing, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Architect under the laws of the State of Wisconsin.



Dated: January 9, 2017


A. James Gersich - Registration No. A-3961

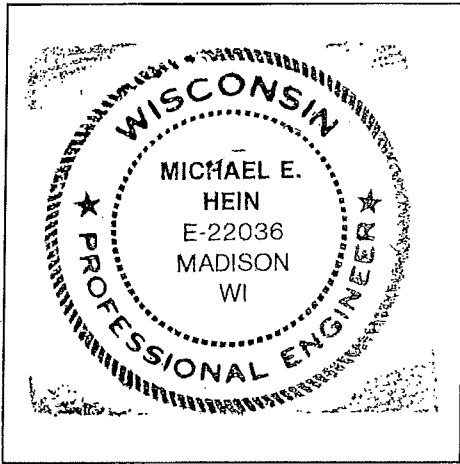
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BID NO. 316058

PROJECT: SCHUMACHER FARM CO. PARK

MEP ENGINEER

I hereby certify that this drawing, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Wisconsin.




Michael E. Hein - Registration No. E-22036

Dated: January 3, 2017

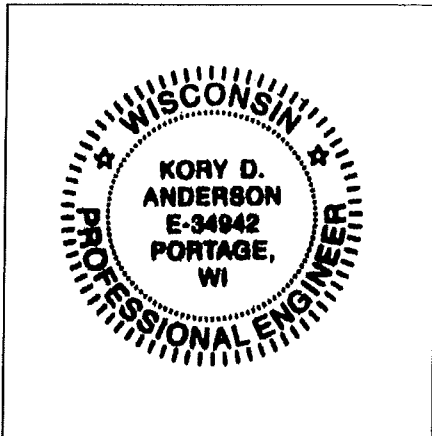
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BID NO. 316058

PROJECT: SCHUMACHER FARM CO. PARK

CIVIL ENGINEER

I hereby certify that this drawing, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Wisconsin.



Kory D. Anderson

Kory D. Anderson - Registration No. E-34942

Dated: January 9, 2017

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TABLE OF CONTENTS FOR RFB NO. 316058

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Project Manual Cover Page
Seals Page
Table of Contents
Advertisement for Bids (Legal Notice)
Best Value Contracting Application
Instructions to Bidders
Bid Form
Fair Labor Practices Certification
Sample Public Works Contract
Sample Bid Bond
Sample Performance Bond
Sample Payment Bond
Equal Benefits Compliance Payment Certification Form
General Conditions of Contract
Supplementary Conditions

DIVISION 01 - GENERAL REQUIREMENTS

01 00 00 - Basic Requirements
01 23 00 - Alternates
01 57 13 - Construction Site Erosion Control
01 74 19 - Construction Waste Management, Disposal & Recycling

DIVISION 03 - CONCRETE

03 30 00 - Cast-in-Place Concrete
03 31 01 - Sitework Concrete

DIVISION 04 - MASONRY

04 23 00 - Glass Unit Masonry

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

06 10 00 – Rough Carpentry & Subflooring
06 40 23 – Interior Architectural Woodwork
06 64 00 – Plastic Paneling

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 21 00 – Thermal Insulation

DIVISION 08 - OPENINGS

08 11 13 – Hollow Metal Doors and Frames
08 14 16 – Flush Wood Doors
08 71 00 – Door Hardware
08 83 00 – Mirrors

DIVISION 09 - FINISHES

09 29 00 – Gypsum Board
09 30 00 – Tiling
09 51 23 – Acoustical Tile Ceilings
09 65 13 – Resilient Base & Accessories
09 91 23 – Interior Painting

DIVISION 10 - SPECIALTIES

10 21 13 – Toilet Compartments

10 28 00 – Toilet & Bath Accessories
10 44 16 – Fire Extinguishers, Cabinets and Accessories

DIVISION 12 - FURNISHINGS

12 35 30 – Residential Casework

DIVISION 21 - FIRE SUPPRESSION

21 00 00 – Fire Suppression

DIVISION 22 - PLUMBING

22 00 00 - Plumbing

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

23 00 00 - HVAC

DIVISION 26 - ELECTRICAL

26 00 00 - Electrical

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 30 00 – Fire Alarm Systems

DIVISION 31 - EARTHWORK

31 22 00 - Site Preparation and Earthwork

31 23 33 - Utility Excavation, Backfill, and Compaction

31 37 16 - Riprap

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 11 23 – Crushed Aggregate Base Course

32 12 16 – Asphaltic Concrete Pavement

32 13 13 – Concrete Sidewalk

32 17 23.14 – Pavement markings

32 92 19 – Soil Preparation and Seeding

DIVISION 33 - UTILITIES

33 11 13 – Water Main Construction

33 41 13 – Storm Sewer Construction

DRAWINGS

Plot drawings on 22" x 34" (ANSI D) paper for correct scale or size.

G0.1 – COVER SHEET

CIVIL

G1.0 – TITLE PAGE

G1.1 – LEGEND & NOTES

C1.0 – EXISTING SITE PLAN

C2.0 – OVERALL PROPOSED SITE PLAN

C2.1 – PROPOSED SITE PLAN

C3.0 – PROPOSED GRADING SITE PLAN

C4.0 – UTILITY SITE PLAN

C4.1 – STORMWATER DEVICES DETAILS

C5.0 – SPOT ELEVATION SITE PLAN-ROAD

C5.1 – SPOT ELEVATION SITE PLAN-PROJECT

C6.0 – MISC. CONSTRUCTION DETAILS

C7.0 – WATERMAIN CONSTRUCTION DETAILS

C8.0 – EROSION CONTROL DETAILS

C9.0 – EROSION CONTROL SPECIFICATIONS

ARCHITECTURAL

- A1.1 – FLOOR PLANS AND REFLECTED CEILING PLAN
- A3.0 – BUILDING SECTIONS
- A5.0 – RESTROOM PLANS AND KITCHENETTE ELEVATIONS
- A6.0 – DOOR AND WALL TYPES AND SCHEDULES
- A7.0 – INTERIOR ELEVATIONS
- A9.0 – FLOOR FINISH PLAN

FIRE PROTECTION

- FP1.1 – GROUND FLOOR PLAN – FIRE PROTECTION
- FP1.2 – ATTIC FLOOR PLANS – FIRE PROTECTION

PLUMBING

- P1.1 – FLOOR PLANS – PLUMBING
- P2.0 – PLUMBING RISERS, SCHEDULES & DETAILS

HVAC

- H1.1 – GROUND FLOOR PLANS – HVAC
- H1.2 – ATTIC FLOOR PLANS – HVAC
- H1.3 – GROUND FLOOR PLAN – RADIANT HEAT
- H2.0 – HVAC SCHEDULES
- H3.0 – HVAC DETAILS

ELECTRICAL

- E1.1 – GROUND FLOOR PLANS – ELECTRICAL
- E1.2 – ATTIC FLOOR PLANS – ELECTRICAL
- E2.0 – ELECTRICAL SCHEDULES
- E3.0 – ELECTRICAL DETAILS
- SE1.0 – SITE ELECTRICAL PLAN

LEGAL NOTICE

INVITATION TO BID

Dane County Public Works, Highway & Transportation Dept., 1919 Alliant Energy Center Way, Madison, WI 53713, will receive sealed Bids until:

2:00 P.M., TUESDAY, JUNE 6, 2017

REQUEST FOR BIDS NO. 316058

SCHUMACHER BARN REMODEL/SITE IMPROVEMENTS

SCHUMACHER FARM COUNTY PARK

5682 WI-19

WAUNAKEE, WISCONSIN

Dane County is inviting Bids for construction services at Schumacher Farm County Park. The project will be for interior construction in the existing barn (including development of restroom facilities for the park), miscellaneous site improvements (grading, basins, paving, etc.). Only firms with capabilities, experience & expertise with similar projects should obtain this Request for Bids document & submit Bids.

Request for Bids document may be obtained after **2:00 p.m. on May 18, 2017** by downloading it from countyofdane.com/pwbids. Please call Eric Urtes, AIA or Ryan Shore, CPESC, Project Managers, at 608/266- 4798 or 608/445-0109, or our office at 608/266-4018, for any questions or additional information.

All Bidders must be a registered vendor with Dane County & pay an annual registration fee & must be pre-qualified as a Best Value Contractor before award of Contract. Complete Vendor Registration Form at danepurchasing.com/Account/Login? or obtain one by calling 608/266-4131. Complete Pre-qualification Application for Contractors at countyofdane.com/pwht/BVC_Application.aspx or obtain one by calling 608/266-4029.

A pre-bid site tour will be held May 25, 2017 at 1:00 p.m. at Schumacher Farm County Park, starting in front of the barn. Bidders, are strongly encouraged to attend this tour.

PUBLISH: MAY 16 & 23, 2017 - WISCONSIN STATE JOURNAL
MAY 16 & 23, 2017 - THE DAILY REPORTER



DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive
Joseph T. Parisi

1919 Alliant Energy Center Way ♦ Madison, Wisconsin 53713
Phone: (608) 266-4018 ♦ FAX: (608) 267-1533

Commissioner / Director
Gerald J. Mandli

BEST VALUE CONTRACTING APPLICATION

CONTRACTORS / LICENSURE APPLICANTS

The Dane County Department of Public Works requires all contractors to be pre-qualified as a best value contractor with the County prior to being awarded a contract. In addition, the County pre-qualifies potential contractors and sub-contractors who wish to work on County contracts. Subcontractors must become pre-qualified ten (10) days prior to commencing work under any Dane County Public Works Contract. Potential subcontractors are urged to become pre-qualified as early as possible. This document shall be completed, properly executed, along with the necessary attachments and additional information that the County requires for the protection and welfare of the public in the performance of a County contract.

Contractors or subcontractors of any tier who attain pre-qualification status will retain that status for a period of two (2) years from the date of qualification. Contractors shall notify the Dane County Department of Public Works, Highway & Transportation within fifteen (15) days of any changes to its business or operations that are relevant to the pre-qualification application. Failure to do so could result in suspension, revocation of the contractor's pre-qualification, debarment from County contracts for up to three (3) years and / or other sanctions available under the law.

No contracts will be awarded for construction work performed on Dane County projects unless the contractor is currently approved as a Wisconsin Trade Trainer or has applied for approval as an Apprenticeship Trade Trainer to the Wisconsin Department of Workforce Development and agrees to an acceptable apprenticeship program. If you are not currently approved as a Wisconsin Trade Trainer, or have not applied for approval as an Apprenticeship Trade Trainer, please contact the Department of Workforce Development - Bureau of Apprenticeship Standards at 608/266-3133 or visit their web site at: dwd.wisconsin.gov/apprenticeship/.

EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to pre-qualify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor / subcontractor provides sufficient documentation to demonstrate one or more of the following:
 - apprentices are not available in a specific geographic area;
 - the applicable apprenticeship program is unsuitable or unavailable; or
 - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possess all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for any project or obtain the same through the use of responsible, pre-qualified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Will your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
3	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Will your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
5	Will your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
6	Does your firm acknowledge that it must pay all craft employees on public works projects the wage rates and benefits required under Section 66.0903 of the Wisconsin Statutes?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
7	Will your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
8	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
9	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
10	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
11	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
12	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
13	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than \$10,000?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
14	Is your firm Executive Order 108 precertified with the State of Wisconsin?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
15	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Is your firm exempt from being pre-qualified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
17	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also pre-qualified with the County or become so ten days prior to commencing work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
18	Contractor has been in business less than one year?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
19	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
20	Not applicable. My firm does not intend to work on Best Value Contracts. Note: Best Value Contracting is required to bid on most Public Works Contracts (if unclear, please call Jan Neitzel Knox 608-266-4029).	Yes: <input type="checkbox"/> No: <input type="checkbox"/>

SIGNATURE SECTION

Your firm's Officer, or the individual who would sign a bid and / or contract documents must sign this document.

I do hereby certify that all statements herein contained are true and correct to the best of my knowledge:

Signature

Date

Printed or Typed Name and Title

NAME AND ADDRESS OF CONTRACTOR	
Name of Firm:	
Address:	
City, State, Zip:	
Telephone Number:	
Fax Number:	
E-mail Address:	

REMEMBER!

Return all to forms and attachments, or questions to:

JAN NEITZEL KNOX
EMAIL: NEITZEL-KNOX@COUNTYOFDANE.COM
OFFICE: (608)266-4029, FAX: (608)267-1533

**DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY & TRANSPORTATION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WI 53713**

APPENDIX A

APPRENTICEABLE TRADES

Bricklayer
Carpenter
Cement Mason (Concrete Finisher)
Cement Mason (Heavy Highway)
Construction Craft Laborer
Data Communications Installer
Electrician
Elevator Mechanic / Technician
Environmental Systems Technician / HVAC Service Technician / HVAC Install & Service
Glazier
Heavy Equipment Operator / Operating Engineer
Insulation Worker (Heat & Frost)
Iron Worker (Assembler, Metal Buildings)
Painter / Decorator
Plasterer
Plumber
Roofer / Waterproofer
Sheet Metal Worker
Sprinkler Fitter
Steamfitter (Service & Refrigeration)
Taper & Finisher
Telecommunications (Voice, Data & Video) Installer / Technician
Tile Setter

INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

1. GENERAL.....	1
2. DRAWINGS AND SPECIFICATIONS	1
3. INTERPRETATION.....	2
4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)	2
5. BID GUARANTEE.....	3
6. WITHDRAWAL OF BIDS.....	3
7. CONTRACT FORM	3
8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS	3
9. EMERGING SMALL BUSINESS PROVISIONS	4
10. METHOD OF AWARD - RESERVATIONS.....	6
11. SECURITY FOR PERFORMANCE AND PAYMENTS	6
12. TAXES.....	6
13. SUBMISSION OF BIDS	7
14. SUBCONTRACTOR LISTING.....	7
15. ALTERNATE BIDS	8
16. INFORMATIONAL BIDS.....	8
17. UNIT PRICES.....	8
18. COMMENCEMENT AND COMPLETION	8
19. WORK BY OWNER	8
20. SPECIAL HAZARDS COVERAGE.....	8
FORM A.....	9
FORM B.....	10
FORM C.....	11
FORM D	12

1. GENERAL

- A. Before submitting Bid, bidder shall thoroughly examine all Construction Documents. Successful Bidder shall be required to provide all the Work that is shown on Drawings, set forth in Specifications, or reasonably implied as necessary to complete Contract for this project.
- B. Bidder shall visit site to become acquainted with adjacent areas, means of approach to site, conditions of actual site and facilities for delivering, storing, placing, and handling of materials and equipment.
- C. Pre-bid meeting is scheduled on May 25, 2017 at 1:00 p.m. at Schumacher Farm County Park, starting in front of the barn. Attendance by all bidders is optional, however bidders and subcontractors are strongly encouraged to attend.
- D. Failure to visit site or failure to examine any and all Construction Documents will in no way relieve successful Bidder from necessity of furnishing any necessary materials or equipment, or performing any work, that may be required to complete the Work in accordance with Drawings and Specifications. Neglect of above requirements will not be accepted as reason for delay in the Work or additional compensation.

2. DRAWINGS AND SPECIFICATIONS

- A. Drawings and Specifications that form part of this Contract, as stated in Article 1 of General Conditions of Contract, are enumerated in Document Index of these Construction Documents.

- B. Complete sets of Drawings and Specifications for all trades will be available to all Bidders, irrespective of category of work to be bid on, in order that all Bidders may be familiar with work of other trades as they affect their bid.

3. INTERPRETATION

- A. No verbal explanation or instructions will be given in regard to meaning of Drawings or Specifications before Bid Due Date. Bidders shall bring inadequacies, omissions or conflicts to Owner or Architect / Engineer's attention at least ten (10) calendar days before Bid Due Date. Prompt clarification will be available to all bidders by Addendum.
- B. Failure to so request clarification or interpretation of Drawings and Specifications will not relieve successful Bidder of responsibility. Signing of Contract will be considered as implicitly denoting that Contractor has thorough understanding of scope of the Work and comprehension of Construction Documents.
- C. Owner will not be responsible for verbal instructions.

4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)

- A. Before award of Contract can be approved, Owner shall be satisfied that Bidder involved meets following requirements:
 - 1. Has completed at least one (1) project of at least fifty percent (50%) of size or value of Division of work being bid and type of work completed is similar to that being bid. If greater magnitude of experience is deemed necessary, other than size or value of work, such requirements will be described in appropriate section of Specifications.
 - 2. Maintains permanent place of business.
 - 3. Can be bonded for terms of proposed Contract.
 - 4. Has record of satisfactorily completing past projects most recent, similar projects, with architect or engineer's and owner's names, addresses and telephone numbers for each project. Submit to Public Works Project Engineer with Bid. Criteria which will be considered in determining satisfactory completion of projects by bidder will include:
 - a. Completed contracts in accordance with drawings and specifications.
 - b. Diligently pursued execution of work and completed contracts according to established time schedule unless Owner grants extensions.
 - c. Fulfilled guarantee requirements of construction documents.
 - d. Is not presently on ineligible list maintained by County's Department of Administration for noncompliance with equal employment opportunities and affirmative action requirements.
 - e. Authorized to conduct business in Wisconsin. By submitting Bid, bidder warrants that it has: complied with all necessary requirements to do business in State of Wisconsin; that persons executing contract on its behalf are authorized to do so; and, if corporation, that name and address of bidder's registered agent are as set forth in Contract. Bidder shall notify Owner immediately, in writing, of any change in its registered agent, their address, and bidder's legal status. For partnership, term "registered agent" shall mean general partner.

- B. County's Public Works Project Engineer will make such investigations as are deemed necessary to determine ability of bidder to perform the Work, and bidder shall furnish to County's Public Works Project Engineer or designee all such information and data for this purpose as County's Public Works Project Engineer may request. Owner reserves right to reject Bid if evidence submitted by, or investigation of, bidder fails to satisfy Owner that bidder is responsible and qualified to carry out obligations of Contract and to complete the Work contemplated therein.

5. BID GUARANTEE

- A. Bank certified check, cashier's check or Bid Bond, payable to County in amount not less than five percent (5%) of maximum bid, shall accompany each Bid as guarantee that if Bid is accepted, Bidder will execute and return proposed Contract and Performance and Payment Bonds within ten (10) business days after being notified of acceptance of Bid. Company issuing bonds must be licensed to do business in Wisconsin.
- B. Any bid, which is not accompanied by bid guarantee, will be considered "No Bid" and will not be read at Bid Due Date.
- C. If successful Bidder so delivers Contract, Certificate of Insurance, and Performance and Payment Bonds, check will be returned to Bidder. In case Bidder fails to deliver such Contract, insurance, and bond, amount of bid guarantee will be forfeited to County as liquidated damages.
- D. All checks tendered as bid guarantee, except those of three (3) lowest qualified, responsible bidders, will be returned to their makers within three (3) business days after Bid Due Date. All such retained checks will be returned immediately upon signing of Contract and Performance and Payment Bonds by successful Bidder.

6. WITHDRAWAL OF BIDS

- A. Bids may be withdrawn by written request received from bidder or authorized representative thereof prior to time fixed for Bid Due Date, without prejudice to right of bidder to file new Bid. Withdrawn Bids will be returned unopened. Negligence on part of bidder in preparing their Bid confers no right for withdrawal of Bid after it has been opened.
- B. No Bid may be withdrawn for period of sixty (60) calendar days after Bid Due Date.
- C. If Bid contains error, omission or mistake, bidder may limit liability to amount of bidder's guarantee by giving written Notice of Intent not to execute Contract to Owner within seventy-two (72) hours of Bid Due Date.

7. CONTRACT FORM

- A. Sample copy of contract that successful Bidder will be required to enter into is included in these Construction Documents and bidders are required to familiarize themselves with all conditions contained therein.

8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS

- A. In accordance with Wisconsin Statute 946.13, county official may not bid for or enter into any contract involving receipts or disbursements of more than \$15,000.00 in a year, in which

they have private pecuniary interest, direct or indirect if at same time they are authorized to take official action with respect to making of this Contract. Any contract entered into in violation of this Statute is void and County incurs no liability thereon. This subsection does not affect application and enforcement of Wisconsin Statute 946.13 by state prosecutors in criminal courts of this state.

9. EMERGING SMALL BUSINESS PROVISIONS

- A. **Emerging Small Business Definition.** For purposes of this provision, ESB is defined as:
1. Independent business concern that has been in business minimum of one year;
 2. Business located in State of Wisconsin;
 3. Business comprised of less than twenty-five (25) employees;
 4. Business must not have gross sales in excess of three million dollars (\$3,000,000.00) over past three years; and
 5. Business does not have history of failing to complete projects.
- B. **Emerging Small Business (ESB) Involvement.** Bidder shall make good faith effort to award minimum of ten percent (10%) of the Work to ESBs. Bidder shall submit report to Dane County Contract Compliance Officer within ten (10) business days of Bid Due Date demonstrating such efforts. Good faith efforts means significant contact with ESBs for purposes of soliciting bids from them. Failure to make or demonstrate good faith efforts will be grounds for disqualification.
- C. **Emerging Small Business Report.** Emerging Small Business Enterprise Report is to be submitted by Bidder in separate envelope marked "Emerging Small Business Report". This report is due by 2:00 p.m. following specified ten (10) business days after Bid Due Date. Bidder who fails to submit Emerging Small Business Report shall be deemed not responsive.
- D. **ESB Goal.** Goal of this project is ten percent (10%) ESB participation. ESB utilizations are shown as percentage of total Bid. If Bidder meets or exceeds specified goal, Bidder is only required to submit Form A - Certification, and Form B - Involvement. Goal shall be met if Bidder qualifies as ESB.
- E. **Report Contents.** Following award of Contract, Bidder shall submit copies of executed contracts for all Emerging Small Businesses. Emerging Small Business Report shall consist of these:
1. Form A - Certification;
 2. Form B - Involvement;
 3. Form C - Contacts;
 4. Form D - Certification Statement (if appropriate); and
 5. Supportive documentation (i.e., copies of correspondence, telephone logs, copies of advertisements).

- F. **ESB Listing.** Bidders may solicit bids from this ESB listing:
pdf.countyofdane.com/commissions/2013-2015_Targeted_Business_Directory.pdf.
- G. **ESB Certification.** All contractors, subcontractors and suppliers seeking ESB certification must complete and submit Emerging Small Business Report to Dane County Contract Compliance Program.
- H. **Certification Statement.** If ESB firm has not been certified by County as ESB prior to submittal of this Bid, ESB Report cannot be used to fulfill ESB goal for this project unless firm provides "Form D - Certification Statement". Certification statement must be completed and signed by ESB firm.
- I. **Questions.** Questions concerning Emerging Small Business provisions shall be directed to:
- Dane County Contract Compliance Officer
City-County Building, Room 421
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703
608/266-5623
- J. **Substituting ESBs.** In event of any significant changes in subcontract arrangements or if need arises to substitute ESBs, Bidder shall report such proposed changes to Contract Compliance Officer to making any official changes and request authorization to substitute ESB firm. Bidder further agrees to make every possible effort to replace ESB firm with another qualified ESB firm.
- K. **Good Faith Efforts.** Good faith efforts can be demonstrated by meeting all of these obligations:
1. Selecting portions of the Work to be performed by ESBs in order to increase likelihood of meeting ESB goal including, where appropriate, breaking down Contract into smaller units to facilitate ESB participation.
 2. Advertising in general circulation, trade associations and women / minority focus media concerning subcontracting opportunities.
 3. Providing written notices to reasonable number of specific ESBs that their interest in Contract was being solicited in sufficient time to allow ESBs to participate effectively.
 4. Following up on initial solicitations of interest by contacting ESBs within five (5) business days prior to Bid Due Date to determine with certainty whether ESB were interested, to allow ESBs to prepare bids.
 5. Providing interested ESB with adequate information about Drawings, Specifications and requirements of Contract.
 6. Using services of available minority, women and small business organizations and other organizations that provide assistance in recruitment of MBEs / WBEs / ESBs.
 7. Negotiating in good faith with interested ESBs, not rejecting ESBs as unqualified without sound reason based on thorough investigation of their capabilities.
 8. Submitting required project reports and accompanying documents to County's Contract Compliance Officer within twenty-four (24) hours after Bid Due Date.

- L. **Appeals Disqualification of Bid.** Bidder who is disqualified may appeal to Public Works & Transportation Committee and Equal Opportunity Commission.

10. METHOD OF AWARD - RESERVATIONS

- A. Following will be basis of award of Contract, providing cost does not exceed amount of funds then estimated by County as available to finance Contract(s):
 - 1. Lowest dollar amount submitted by qualified responsible bidder on Base Bid for all work comprising project, combined with such additive Owner accepted alternates.
 - 2. Owner reserves right to reject all bids or any bid, to waive any informality in any bid, and to accept any bid that will best serve interests of County.
 - 3. Unit Prices and Informational Bids will not be considered in establishing low bidder.

11. SECURITY FOR PERFORMANCE AND PAYMENTS

- A. Simultaneous with delivery of signed Contract, Bidder shall be required to furnish Performance and Payment Bonds as specified in Article 29 of General Conditions of Contract, "Contract Security". Surety Company shall be licensed to do business in Wisconsin. Performance and Payment Bonds must be dated same date or subsequent to date of Contract. Performance and Payment Bonds must emulate information in Sample Performance and Payment Bonds in Construction Documents.
- B. Provide certified copy of power of attorney from Surety Company showing that agent who signs Bond has power of attorney to sign for Surety Company. Secretary or Assistant Secretary of company must sign this certification, not attorney-in-fact. Certification must bear same or later date as Bond. Power of Attorney must emulate model power of attorney information detailed in Sample Performance and Payment Bonds.
- C. If Bidder is partnership or joint venture, State certified list, providing names of individuals constituting partnership or joint venture must be furnished. Contract itself may be signed by one partner of partnership, or one partner of each firm comprising joint venture, but Performance and Payment Bonds must be signed by all partners.
- D. If Bidder is a corporation, it is necessary that current certified copy of resolution or other official act of directors of corporation be submitted showing that person who signs Contract is authorized to sign contracts for corporation. It is also necessary that corporate seal be affixed to resolution, contract, and performance and payment bonds. If your corporation has no seal, it is required that above documents include statement or notation to effect that corporation has no seal.

12. TAXES

- A. Wisconsin Statute 77.54 (9m) allows building materials that become part of local unit government facilities to be exempt from sales & use tax. Vendors & materials suppliers may not charge Bidders sales & use tax on these purchases. This does not include highways, streets or roads. Any other Sales, Consumer, Use & other similar taxes or fees required by law shall be included in Bid.

- B. In accordance with Wisconsin Statute 71.80(16)(a), successful nonresident bidder, whether incorporated or not, and not otherwise regularly engaged in business in this state, shall file surety bond with State of Wisconsin Department of Revenue payable to Department of Revenue, to guarantee payment of income taxes, required unemployment compensation contributions, sales and use taxes and income taxes withheld from wages of employees, together with any penalties and interest thereon. Amount of bond shall be three percent (3%) of Contract or subcontract price on all contracts of \$50,000 or more.

13. SUBMISSION OF BIDS

- A. All Bids shall be submitted on standard Bid Form bound herein and only Bids that are made on this Bid Form will be considered. Entire Bid Form and other supporting documents, if any, shall be removed or copied from Construction Documents, filled out, and submitted in manner specified hereinafter. Submit completed Bid Bond with Bid as well.
- B. No bids for any subdivision or any sub-classification of this Work, except as indicated, will be accepted. Any conditional Bid, amendment to Bid Form or appended item thereto, or inclusion of any correspondence, written or printed matter, or details of any nature other than that specifically called for, which would alter any essential provision of Construction Documents, or require consideration of unsolicited material or data in determining award of Contract, will disqualify Bid. Telecommunication alterations to Bid will not be accepted.
- C. Bidders must submit single Bid for all the Work.
- D. Bid amounts shall be inserted in words and in figures in spaces provided on Bid Form; in case of conflict, written word amounts will govern.
- E. Addenda issued after Bid Letting shall become part of Construction Documents. Bidders shall acknowledge receipt of such addenda in appropriate space provided on Bid Form. Bid may be rejected if receipt of any particular addendum applicable to award of Contract has not been acknowledged on Bid Form.
- F. Bids shall be signed, placed in envelope, sealed and delivered before due time to place designated in Invitation to Bid, and identified with project name, bid number, location, category of work being bid upon, Bid Due Date, name and address of bidder.
- G. Bidder shall be responsible for sealed Bid being delivered to place designated for Bid Due Date on or before date and time specified. Bids received after time of closing will be rejected and returned to bidder unopened.
- H. Bid will be considered invalid and will be rejected if bidder has not signed it.
- I. Faxed or emailed Bids will not be accepted.
- J. Bidder's organization shall submit completed with Bid, Fair Labor Practices Certification form, included in these Construction Documents.

14. SUBCONTRACTOR LISTING

- A. Bidders shall be required to submit list of major subcontractors for General Construction, Plumbing, HVAC, and Electrical work proposed for this project to include committed prices for each subcontractor. List shall be placed in separate sealed envelope that must be clearly identified as "Major Subcontractor List", for named project and name of Bidder submitting

it. County must receive envelope no later than date by which successful Bidder is required to submit his or her signed Contract, as established in Construction Documents.

15. ALTERNATE BIDS

- A. Bidder shall carefully read requests for Alternate Bids, and thoroughly examine Drawings and Specifications to determine extent various changes and conditions will affect Bid.
- B. Space is provided in Bid Form for requested Alternate Bids. Failure to submit bid for any requested Alternate Bids may result in rejection of entire Bid.
- C. Bidder shall state amount to be added / subtracted to Base Bid for providing alternates, including all incidentals, omissions, additions, and adjustments as may be necessary or required by such changes. If there is no difference in price, Bidder shall state, "No Change".
- D. Descriptions of requested Alternate Bids are as set forth in Construction Documents (including Section 01 23 00 Alternates).

16. INFORMATIONAL BIDS

- A. Not Applicable

17. UNIT PRICES

- A. Not Applicable .

18. COMMENCEMENT AND COMPLETION

- A. Successful Bidder shall commence work when schedule and weather permit, but no later than stated in Bid Form. Contractor shall pursue the Work regularly and continuously at reasonable rate to insure completion of the Work within time stated in Bid.
- B. Should it be found impossible to complete the Work on or before time specified for completion, written request may be submitted for extension of time setting forth reasons believed to justify granting of such request. Refer to Article 20 of General Conditions of Contract, titled "Time for Completion".

19. WORK BY OWNER

- A. Not Applicable.

20. SPECIAL HAZARDS COVERAGE

- A. Not Applicable.

FORM A

**DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION**

In accordance with General Conditions of Contract, submit this Emerging Small Business Report within ten (10) days after Bid Due Date.

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

BIDDER INFORMATION

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE NO.: _____

CONTACT PERSON: _____

EMAIL ADDRESS: _____

FORM B

Page ___ of ___

DANE COUNTY

(Copy this Form as necessary to provide complete information)

EMERGING SMALL BUSINESS REPORT - INVOLVEMENT

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

Indicate percentage of financial commitment to this ESB: _____ % Amount: \$ _____

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

Indicate percentage of financial commitment to this ESB: _____ % Amount: \$ _____

FORM C

Page ___ of ___

DANE COUNTY

(Copy this Form as necessary to provide complete information)

EMERGING SMALL BUSINESS REPORT - CONTACTS

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

	<u>ESB FIRM NAME CONTACTED</u>	<u>DATE</u>	<u>PERSON CONTACTED</u>	<u>DID ESB BID?</u>	<u>ACC- EPT BID?</u>	<u>REASON FOR REJECTION</u>
1)	_____	_____	_____	_____	_____	_____
2)	_____	_____	_____	_____	_____	_____
3)	_____	_____	_____	_____	_____	_____
4)	_____	_____	_____	_____	_____	_____
5)	_____	_____	_____	_____	_____	_____
6)	_____	_____	_____	_____	_____	_____
7)	_____	_____	_____	_____	_____	_____
8)	_____	_____	_____	_____	_____	_____

FORM D

**DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION STATEMENT**

I, _____, _____ of
Name Title

_____ certify to best of my knowledge and
Company

belief that this business meets Emerging Small Business definition as indicated in Article 9 and
that information contained in this Emerging Small Business Report is true and correct.

Bidder's Signature

Date

Name of Bidding Firm: _____

BID FORM

BID NO. 316058

PROJECT: SCHUMACHER BARN REMODEL AND SITE IMPROVEMENTS

SCHUMACHER FARM COUNTY PARK

**TO: DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY & TRANSPORTATION PROJECT MANAGER
1919 ALLIANT ENERGY CENTER WAY
MADISON, WISCONSIN 53713**

NOTE: WISCONSIN STATUTE 77.54 (9M) ALLOWS FOR NO SALES & USE TAX ON THE PURCHASE OF MATERIALS FOR COUNTY PUBLIC WORKS PROJECTS.

BASE BID - LUMP SUM:

Dane County is inviting Bids for construction services at Schumacher Farm County Park. The project will be for interior construction in the existing barn (including development of restroom facilities for the park) and miscellaneous site improvements (grading, basins, paving, etc.). The undersigned, having examined the site where the Work is to be executed and having become familiar with local conditions affecting the cost of the Work and having carefully examined the Drawings and Specifications, all other Construction Documents and Addenda thereto prepared by Dane County Department of Public Works, Highway & Transportation hereby agrees to provide all labor, materials, equipment and services necessary for the complete and satisfactory execution of the entire Work, as specified in the Construction Documents, for the Base Bid stipulated sum of:

_____ and _____/100 Dollars
Written Price

\$ _____
Numeric Price

The undersigned agrees to add the alternate(s) portion of the Work as described, for the following addition(s) to or subtraction(s) from the Base Bid, as stipulated below.

ALTERNATE BID 1 - LUMP SUM:

Add price for providing Alternate Bid 1: Install colored concrete in Gathering Space 100 and Kitchenette 105. Base bid is for sealed concrete for these two rooms.

_____ and _____/100 Dollars
Written Price

\$ _____
Numeric Price (circle: Add or Deduct)

ALTERNATE BID 2 - LUMP SUM:

Add price for providing Alternate Bid 2: Furnish and install in Kitchenette 105:

1. Cabinetry equivalent to Dura Supreme® Homestead Panel Full Overlay in hickory wood species in natural finish
2. Plastic laminate countertop
3. Elkay® Lustertone stainless steel 33” x 22” x 6-1/2” equal double bowl top mount sink model LRAD332265PD with Moen® Belfield two-handle faucet model 7250 in spot resistant stainless finish, and electrical light fixture D

Base bid has these items furnished and installed by Others.

_____ and _____ /100 Dollars
Written Price

\$ _____
Numeric Price (circle: Add or Deduct)

ALTERNATE BID 3 - LUMP SUM:

Add price for providing Alternate Bid 3: Furnish and install low voltage wiring and devices from the phone and data outlets to the phone and data service location in Mechanical Room 103; to furnish and install low voltage wiring from electric door strike E100 and E102 to Office 104 west wall location and to provide the software system with training for controlling the locking and unlocking of these doors.

Base bid has these items furnished and installed by Others.

_____ and _____ /100 Dollars
Written Price

\$ _____
Numeric Price (circle: Add or Deduct)

Receipt of the following addenda and inclusion of their provisions in this Bid is hereby acknowledged:

Addendum No(s). _____ through _____

Dated _____

Dane County Division of Land & Water Resources must have this project completed by December 15, 2017 (Barn Remodeling suitable for Occupancy and gravel parking/ADA access) and final site work (including paving) complete by June 15, 2018. Assuming this Work can be started by July 24, 2017, what dates can you commence and complete this job?

Commencement Date: _____ Completion Date: _____
(final, not substantial)

I hereby certify that all statements herein are made on behalf of:

(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

1. A corporation organized and existing under the laws of the State of _____, or
2. A partnership consisting of _____, or
3. A person conducting business as _____;

Of the City, Village, or Town of _____ of the State of _____.

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

The undersigned further agrees to honor the Base Bid and the Alternate Bid(s) for sixty (60) calendar days from date of Award of Contract.

SIGNATURE: _____
(Bid is invalid without signature)

Print Name: _____ Date: _____

Title: _____

Address: _____

Telephone No.: _____ Fax No.: _____

Email Address: _____

Contact Person: _____

THIS PAGE IS FOR BIDDERS' REFERENCE AND NEED NOT BE SUBMITTED WITH BID FORM.

BID CHECK LIST:

These items **must** be included with Bid:

- Bid Form Bid Bond Fair Labor Practices Certification
 Project Experience / Reference Summary – Attach additional Sheet(s) as needed.

BIDDERS SHOULD BE AWARE OF THE FOLLOWING:

DANE COUNTY VENDOR REGISTRATION PROGRAM

Any person bidding on any County contract must be registered with the Dane County Purchasing Division & pay an annual registration fee. A contract will not be awarded to an unregistered vendor. Obtain a *Vendor Registration Form* by calling 608/266-4131 or complete a new form or renewal online at:
www.danepurchasing.com/registration

DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION

Contractors must be pre-qualified as a Best Value Contractor with the Dane County Public Works Engineering Division before the award of contract. Obtain a *Best Value Contracting Application* by calling 608/266-4018 or complete one online at:
www.countyofdane.com/pwht/BVC_Application.aspx

EQUAL BENEFITS REQUIREMENT

By submitting a Bid, the contractor acknowledges that a condition of this contract is to provide equal benefits as required by Dane County Code of Ordinances Chapter 25.016. Contractor shall provide equal benefits as required by that Ordinance to all required employees during the term of the contract. Equal Benefits Compliance Payment Certification shall be submitted with final pay request. For more information:
www.danepurchasing.com/partner_benefit.aspx

FAIR LABOR PRACTICES CERTIFICATION

The undersigned, for and on behalf of the BIDDER, APPLICANT or PROPOSER named herein, certifies as follows:

- A. That he or she is an officer or duly authorized agent of the above-referenced BIDDER, APPLICANT or PROPOSER, which has submitted a bid, application or proposal for a contract or agreement with the county of Dane.
- B. That BIDDER, APPLICANT or PROPOSER has (check one):

_____ not been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

_____ been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

Officer or Authorized Agent Signature	Date
Printed or Typed Name and Title	
Printed or Typed Business Name	

NOTE: You can find information regarding the violations described above at: www.nlr.gov and werc.wi.gov.

For reference, Dane County Ordinance 25.11(28)(a) is as follows:
(28) BIDDER RESPONSIBILITY. (a) Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The purchasing manager shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder’s responsibility to perform the contract.

If you indicated that the NLRB or WERC have found you to have such a violation, you must include copies of any relevant information regarding such violation with your proposal, bid or application.

Include this completed Certification with your bid, application or proposal.

COUNTY OF DANE

PUBLIC WORKS CONSTRUCTION CONTRACT

Contract No. _____ Bid No. 316058

Authority: 2017 RES - _____

THIS CONTRACT, made and entered into as of the date by which authorized representatives of both parties have affixed their signatures, by and between the County of Dane (hereafter referred to as "COUNTY") and _____ (hereafter, "CONTRACTOR"), and

WITNESSETH:

WHEREAS, COUNTY, whose address is c/o Assistant Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide The Remodel/Site Improvements at Schumacher Barn including Alternate Bids 1, 2 & 3 (if accepted) ("the Project"); and

WHEREAS, CONTRACTOR, whose address is _____ is able and willing to construct the Project, in accordance with the Construction Documents;

NOW, THEREFORE, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and CONTRACTOR do agree as follows:

1. CONTRACTOR agrees to construct, for the price of \$ _____ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence/labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, General Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by Dimension IV, Inc. (DIM-IV) and General Engineering Company (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Table of Contents, all of which are made a part hereof and collectively evidence and constitute the Contract.

2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the General Conditions of Contract, and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the General Conditions of Contract.

3. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force

or any other reserve component of the military forces of the United States, or political beliefs. Such equal opportunity shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

4. CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) business days of the effective date of this Contract. During the term of this Contract CONTRACTOR shall also provide copies of all announcements of employment opportunities to COUNTY'S Contract Compliance Office, and shall report annually the number of persons, by race, ethnicity, gender, and disability status, which apply for employment and, similarly classified, the number hired and number rejected.

5. During the term of this Contract, all solicitations for employment placed on CONTRACTOR'S behalf shall include a statement to the effect that CONTRACTOR is an "Equal Opportunity Employer".

6. CONTRACTOR agrees to comply with provisions of Chapter 25.016 of the Dane County Code of Ordinances, which pertains to domestic partnership benefits.

7. CONTRACTOR agrees to furnish all information and reports required by COUNTY'S Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provisions of this Contract.

8. CONTRACTOR agrees that all persons employed by CONTRACTOR or any subcontractor shall be paid no less than the minimum wage established under Chapter 40, Subchapter II, Dane County Code of Ordinances. CONTRACTOR agrees to abide by and comply with the provisions of Chapter 40, Subchapter II of the Dane County Code of Ordinances, and said Subchapter is fully incorporated herein by reference.

9. This Contract is intended to be a Contract solely between the parties hereto and for their benefit only. No part of this Contract shall be construed to add to, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties including, but not limited to, employees of either of the parties.

10. The entire agreement of the parties is contained herein and this Contract supersedes any and all oral agreements and negotiations between the parties relating to the subject matter hereof. The parties expressly agree that the express terms of this Contract shall not be amended in any fashion except in writing, executed by both parties.

11. CONTRACTOR must be pre-qualified as a Best Value Contractor with Dane County Public Works Engineering Division before award of Contract. Subcontractors must be pre-qualified ten (10) business days prior to commencing Work under this Contract.

IN WITNESS WHEREOF, COUNTY and CONTRACTOR, by their respective authorized agents, have caused this Contract and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

* * * * *

FOR CONTRACTOR:

Signature Date

Printed or Typed Name and Title

Signature Date

Printed or Typed Name and Title

NOTE: If CONTRACTOR is a corporation, Secretary should attest. In accordance with IRS Regulations, unincorporated entities are required to provide either their Social Security or Employer Number in order to receive payment for services rendered.

* * * * *

This Contract is not valid or effectual for any purpose until approved by the appropriate authority designated below, and no work is authorized until the CONTRACTOR has been given notice to proceed by COUNTY'S Assistant Public Works Director.

FOR COUNTY:

Joseph T. Parisi, County Executive Date

Scott McDonell, County Clerk Date

AIA[®] Document A310[™] – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

BOND AMOUNT:**PROJECT:**

(Name, location or address, and Project number, if any)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this _____ day of _____

_____	(Contractor as Principal)	(Seal)
(Witness)	_____	(Title)
_____	(Surety)	(Seal)
(Witness)	_____	(Title)

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

CONSTRUCTION CONTRACT

Date:

Amount:

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

SURETY

Company: *(Corporate Seal)*

Signature: _____

Name _____
and Title: _____

Signature: _____

Name _____
and Title: _____

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

Sample

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

SURETY

Company: _____

(Corporate Seal)

Company: _____

(Corporate Seal)

Signature: _____

Name and Title: _____

Address _____

Signature: _____

Name and Title: _____

Address _____

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

CONSTRUCTION CONTRACT

Date:

Amount:

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

SURETY

Company: *(Corporate Seal)*

Signature: _____

Name _____
and Title: _____

Signature: _____

Name _____
and Title: _____

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____

(Corporate Seal)

SURETY

Company: _____

(Corporate Seal)

Signature: _____

Name and Title: _____

Address _____

Signature: _____

Name and Title: _____

Address _____

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

EQUAL BENEFITS COMPLIANCE PAYMENT CERTIFICATION FORM

PURPOSE

25.016(8) of the Dane County Ordinance requires that each contractor receiving payment for contracted services must certify that he or she has complied fully with the requirements of Chapter 25.016 “Equal Benefits Requirement” of the Dane County Ordinances. Such certification must be submitted prior to the final payment on the contract.

This form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

CERTIFICATION

I, _____ certify that
Printed or Typed Name and Title

Printed or Typed Name of Contractor

has complied fully with the requirements of Chapter 25.016 of the Dane County Ordinances “Equal Benefits Requirements”.

Signed _____

Date _____

For questions on this form, please contact Chuck Hicklin at 608-266-4109 or your contract representative at Dane County.

GENERAL CONDITIONS OF CONTRACT

TABLE OF CONTENTS

1. CONSTRUCTION DOCUMENTS	2
2. DEFINITIONS	2
3. ADDITIONAL INSTRUCTIONS AND DRAWINGS	2
4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES	3
5. CUTTING AND PATCHING.....	4
6. CLEANING UP	4
7. USE OF SITE.....	4
8. MATERIALS AND WORKMANSHIP	5
9. CONTRACTOR'S TITLE TO MATERIALS	5
10. "OR EQUAL" CLAUSE.....	5
11. PATENTS AND ROYALTIES.....	6
12. SURVEYS, PERMITS, REGULATIONS AND TAXES.....	7
13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE.....	7
14. WEATHER CONDITIONS	8
15. PROTECTION OF WORK AND PROPERTY	8
16. INSPECTION AND TESTING OF MATERIALS	8
17. REPORTS, RECORDS AND DATA	9
18. CHANGES IN THE WORK	9
19. EXTRAS	10
20. TIME FOR COMPLETION.....	10
21. CORRECTION OF WORK.....	10
22. SUBSURFACE CONDITIONS FOUND DIFFERENT	11
23. RIGHT OF DEPARTMENT TO TERMINATE CONTRACT	11
24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES	11
25. PAYMENTS TO CONTRACTOR	12
26. WITHHOLDING OF PAYMENTS.....	13
27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE	14
28. PAYMENTS BY CONTRACTOR.....	14
29. CONTRACT SECURITY	14
30. ASSIGNMENTS.....	15
31. MUTUAL RESPONSIBILITY OF CONTRACTORS	15
32. SEPARATE CONTRACTS	15
33. SUBCONTRACTS	15
34. PUBLIC WORKS PROJECT MANAGER'S AUTHORITY	16
35. ARCHITECT / ENGINEER'S AUTHORITY	16
36. STATED ALLOWANCES	17
37. ESTIMATES OF QUANTITIES	17
38. LANDS AND RIGHTS-OF-WAY	17
39. GENERAL GUARANTEE.....	17
40. CONFLICTING CONDITIONS	18
41. NOTICE AND SERVICE THEREOF	18
42. PROTECTION OF LIVES AND HEALTH	18
43. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES	18
44. COMPLIANCE WITH FAIR LABOR STANDARDS	19
45. DOMESTIC PARTNERSHIP BENEFITS	19
46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE	20
47. MINIMUM WAGES	20
48. CLAIMS	21
49. ANTITRUST AGREEMENT	21
50. INSURANCE.....	21
51. WISCONSIN LAW CONTROLLING	23

1. CONSTRUCTION DOCUMENTS

- A. Construction Documents, listed in Table of Contents of this Specification volume shall form part of this Contract and provisions of Construction Documents shall be as binding upon parties as if they were fully set forth in Contract itself.
- B. These shall also be considered as part of Construction Documents: Addenda, including additions and modifications incorporated in such addenda before execution of Contract; requests for information; construction bulletins; change orders; and written interpretations by Architect / Engineer or Public Works Project Manager that are made after execution of Contract.
- C. Construction Documents are complementary, and what is required by one shall be as binding as if required by all. Intent of Construction Documents is to include all labor, materials and equipment necessary for proper execution of the Work.

2. DEFINITIONS

- A. These terms as used in this Contract are respectively defined as follows:
 - 1. All uses of term "County" in Construction Documents shall mean Dane County.
 - 2. All uses of term "Department" in Construction Documents shall mean Department of Public Works, Highway & Transportation, which is a unit of Dane County government. Department is County agency overseeing Contract with Contractor.
 - 3. Public Works Project Manager is appointed by and responsible to Department. Public Works Project Manager has authority to act on behalf of Department and will sign change orders, payment requests and other administrative matters related to projects.
 - 4. Public Works Project Manager is responsible for supervision, administration and management of field operations involved in construction phase of this Work.
 - 5. Term "Work" includes all labor, equipment and materials necessary to produce project required by Construction Documents.
 - 6. Term "Substantial Completion" is date when project or specified area of project is certified by Architect / Engineer that construction is sufficiently completed, in accordance with Construction Documents, and as modified by any subsequent changes agreed to by parties, so that County may occupy project or specified area of project for use for which it was intended subject to permit approval for occupancy.
 - 7. Contractor is person, firm, or corporation with whom County makes Contract. Though multiple contracts may be involved, Construction Documents treat them throughout as if each were of singular number.

3. ADDITIONAL INSTRUCTIONS AND DRAWINGS

- A. Contractor may be furnished additional instructions and detail drawings as necessary to carry out the Work included in Contract. Additional drawings and instructions thus supplied to Contractor will coordinate with Construction Documents and will be so prepared that they can be reasonably interpreted as part thereof. Contractor shall carry out the Work in accordance with additional detail drawings and instructions.

4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Unless otherwise specified, Contractor shall submit three (3) copies of all Shop Drawings for each submission, until receiving final approval. After final approval, provide five (5) additional copies for distribution and such other copies as may be required.
- B. Contractor shall submit, on an on-going basis and as directed, Product Data such as brochures that shall contain catalog cuts and specifications of all furnished mechanical and electrical equipment. After Architect / Engineer's approval, one (1) copy shall remain in Architect / Engineer's file, one (1) kept at Department's office and one (1) kept at job site by Contractor for reference purposes.
- C. Samples shall consist of physical examples furnished by Contractor in sufficient size and quantity to illustrate materials, equipment or workmanship, and to establish standards to compare the Work.
 - 1. Submit Samples in sufficient quantity (minimum of two (2)) to permit Architect / Engineer to make all necessary tests and of adequate size showing quality, type, color range, finish, and texture. Label each Sample stating material, type, color, thickness, size, project name, and Contractor's name.
 - 2. Submit transmittal letter requesting approval, and prepay transportation charges to Architect / Engineer's office on samples forwarded.
 - 3. Materials installed shall match approved Samples.
- D. Contractor shall review Shop Drawings and place their dated stamp thereon to evidence their review and approval and shall submit with reasonable promptness and in orderly sequence to cause no delay in the Work or in work of any other contractor. At time of submission, Contractor shall inform Architect / Engineer in writing of any deviation in Shop Drawings or Samples from requirements of Construction Documents. Architect / Engineer will not consider partial lists.
- E. Architect / Engineer will review and approve or reject Shop Drawings with reasonable promptness to cause no delay. Architect / Engineer's approval shall not relieve Contractor from responsibility for errors or omissions in Shop Drawings.
- F. Contractor shall not commence any work requiring Shop Drawing, Product Data or Sample submission until Architect / Engineer has approved submission. All such work shall be in accordance with approved Shop Drawings, Product Data and Samples.
- G. Contractor shall keep on site of the Work, approved or conformed copy of Shop Drawings and shall at all time give Department access thereto.
- H. By stamping and submitting Shop Drawings, Product Data and Samples, Contractor thereby represents that he or she has or will determine and verify all field measurements, field construction criteria, materials, catalog numbers, and similar data and that he or she has checked and coordinated each Shop Drawing, Product Data and Sample with requirements of the Work and of Construction Documents. Architect / Engineer shall return without examination, Shop Drawings, Product Data and Samples not so noted.
- I. All Shop Drawings from any one Contractor should be numbered consecutively and on cover sheet shall bear name and location of project, name of Contractor, date of submittal and date of each correction or revision and associated Specification section and page number.

5. CUTTING AND PATCHING

- A. Contractor shall be responsible for all cutting, fitting or patching required to complete the Work or to make its parts fit together properly.
- B. Contractor shall not damage or endanger portion of the Work or fully or partially completed construction of County or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. Contractor shall not cut or otherwise alter such construction by County or separate contractor except with written consent of County and of such separate contractor; such consent shall not be unreasonably withheld. Contractor shall not withhold unreasonably from County or separate contractor, Contractor's consent to cutting or otherwise altering the Work.

6. CLEANING UP

- A. Contractor shall keep premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under Contract. Contractor shall remove from and about the Work waste materials, rubbish, Contractor's tools, construction equipment, machinery, and surplus materials at completion of the Work. Contractor shall maintain streets and sidewalks around the Work site in clean condition. Contractor shall remove all spillage and prevent tracking of spillage arising from performance of the Work, into, out of, and within the Work site. Contractor shall establish regular maintenance program of sweeping, vacuuming and / or hosing to minimize accumulation of dirt and dust upon such areas.
- B. If Contractor fails to clean up as directed in Construction Documents, County may do so and shall charge Contractor cost thereof.
- C. Contractor shall be responsible for broken windows and glass, and at completion of the Work shall replace such damaged or broken windows and glass. After replacing damaged or broken windows and glass, Contractor shall remove all labels, wash and polish both sides of all windows and glass.
- D. In addition to general cleaning (sweeping, vacuuming and / or hosing, as is appropriate to work surface), Contractor shall perform following final cleaning for all trades at completion of the Work:
 - 1. Remove temporary protections;
 - 2. Remove marks, stains, fingerprints and other soil or dirt from painted, decorated and finished woodwork and wall surfaces;
 - 3. Remove spots, plaster, soil and paint from ceramic tile, marble and other finished materials, and wash or wipe clean;
 - 4. Clean fixtures, cabinet work and equipment, removing stains, paint, dirt and dust, and leave same in undamaged, new condition;
 - 5. Clean aluminum in accordance with recommendations of manufacturer; and
 - 6. Clean resilient floors thoroughly with well-rinsed mop containing only enough moisture to clean off any surface dirt or dust and buff dry by machine to bring surfaces to sheen.

7. USE OF SITE

- A. Contractor shall provide County and Architect / Engineer access to the Work under all circumstances.

- B. Contractor shall confine operations at site to areas permitted by County, law, ordinance, permits and Construction Documents and shall not unreasonably encumber site with materials or equipment. Contractor shall assure free, convenient, unencumbered, direct and safe access to all properties adjacent to the Work for County, its employees, invitees and guests.

8. MATERIALS AND WORKMANSHIP

- A. Contractor shall perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, necessary to complete the Work required by this Contract, within time specified, in accordance with provisions of Construction Documents.
- B. All equipment and materials incorporated in the Work covered by this Contract are to be new; use recycled and / or recovered materials to extent that such use is technically and economically feasible. Recovered materials are products recovered from solid waste in form identical to original form for use that is same as, or similar to original use. Recycled materials are products manufactured from solid waste.
- C. If requested, Contractor shall furnish satisfactory evidence as to kind and quality of construction materials proposed or used. Contractor shall furnish to Architect / Engineer, for approval, manufacturer name and model, performance capacities and other pertinent information of machinery, mechanical, electrical or other types of equipment, which Contractor plans to install.
- D. If not otherwise provided, materials and labor called for in this Contract shall be provided and performed in accordance with established practice and standards recognized by Architects, Engineers, Department, and construction industry.
- E. Reference to "Standard" specifications of any association or manufacturer, or codes of County authorities, intends most recent printed edition or catalog in effect on date that corresponds with date of Construction Documents.
- F. Whenever reference is made in Specifications that work shall be "performed", "applied", in accordance with "manufacturer's directions or instructions", Contractor to whom those instructions are directed shall furnish three (3) printed copies of such instructions to Architect / Engineer before execution of the Work.

9. CONTRACTOR'S TITLE TO MATERIALS

- A. Contractor or any subcontractor shall not purchase materials or supplies for the Work subject to any chattel mortgage or under conditional sale contract or other agreement by which seller retains interest. Contractor warrants that all materials and supplies used in the Work are free from all liens, claims or encumbrances and Contractor has good title to them.

10. "OR EQUAL" CLAUSE

- A. Whenever equipment or materials are identified on Drawings or in Specifications by reference to manufacturer's or vendor's name, trade name, catalog number, and other identifying information, it is intended to establish standards; and any equipment or material of other manufacturers and vendors which will perform adequately duties imposed by general design will be considered equally accepted provided equipment or material so proposed is, in opinion of Architect / Engineer, of equal substance and function. Architect / Engineer and Department shall provide written approval before Contractor may purchase or install it.

- B. Equipment or materials of manufacturers, other than those named, may be used only upon following conditions:
1. That, in opinion of Architect / Engineer and Department, proposed material or equipment item is fully equal or superior (in design, materials, construction, workmanship, performance, finish, etc.) to named item. No compromise in quality level, however small, is acceptable.
 2. That, in substituting materials or equipment, Contractor assumes responsibility for any changes in system or for modifications required in adjacent or related work to accommodate such substitution despite Architect / Engineer's and Department's approval, and all costs growing out of approval of "or equal" items shall be responsibility of Contractor. No extra costs resulting from such approval shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
 3. It shall be understood that use of materials or equipment other than those specified, or approved equal by Architect / Engineer and Department, shall constitute violation of Contract, and that Architect / Engineer and Department shall have right to require removal of such materials or equipment and their replacement with specified materials or equipment at Contractor's expense.
 4. Product and manufacturer named first in Specifications or on information shown on Drawings is basis of selection of manufactured items and equipment, particularly mechanical equipment. In using other than first named products or manufacturers, including those specified as additionally approved or acceptable, Contractor assumes responsibility for any changes in system and for modifications in any work required to accommodate them. Architect / Engineer's approval of such additionally acceptable products or manufacturers, either in Specifications or in Addendum, does not relieve Contractor from obligation to coordinate such optional products with other Contractors, whose work may be affected by them, and to pay all additional costs resulting from their inclusion into the Work. Contractor's liability shall include payment of Architect / Engineer's fees for any additional services made necessary by or directly connected to such product changes. No extra costs resulting from such changes shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
- C. No request for approval of "or equal" materials will be entertained except from Contractor. Identify any request for substitution as substitution on Contractor's letter of transmittal and give reasons for substitution. Department may in its sole discretion allow substitutions of materials.

11. PATENTS AND ROYALTIES

- A. If Contractor uses any design, device or material covered by letters, patent or copyright, it is mutually agreed and understood, that, without exception, contract prices shall include all royalties or costs arising from use of such design, device or materials, in any way involved in the Work.
- B. Contractor shall indemnify and save harmless County from any and all claims for infringement by reason of use of such patent or copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify County for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during prosecution of the Work or after completion of the Work.

12. SURVEYS, PERMITS, REGULATIONS AND TAXES

- A. Department will furnish to Contractor all site, topography and property surveys necessary for execution of the Work.
- B. Contractor shall procure all permits, licenses and approvals necessary for execution of this Contract.
- C. Contractor shall give all notices and comply with all State of Wisconsin, Federal and local laws, codes, rules and regulations relating to performance of the Work, protection of adjacent property, and maintenance of passageways, guard fences or other protective facilities.
- D. Contractor shall pay all Sales, Consumer, Use and other similar taxes required by law.
- E. Contractor shall promptly notify Architect / Engineer of any variances of Drawings or Specifications with that of any State of Wisconsin, federal or local law, code, rule or regulation. Upon such notification, Architect / Engineer will require correction of variance to comply with applicable law, code, rule or regulation at no additional cost to Contractor.
- F. Work under this Contract shall comply with all applicable State of Wisconsin, Federal and local laws, codes and regulations.
- G. Contractor shall pay charges for water, sewer and other utility connections made by municipalities where required by Specifications.

13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE

- A. Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and superintendence necessary to execute, complete and deliver the Work within specified time. Contractor agrees to secure at their own expense all personnel necessary to carry out the Work. Such personnel shall not be deemed County employees nor shall they have or be deemed to have any direct contractual relationship with County.
- B. Performance of any work necessary after regular working hours, on Sundays or Legal Holidays shall be without additional expense to County. Performance of any work at site at other than normal working hours must be coordinated with Public Works Project Manager.
- C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.
- D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.
- E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ construction superintendent or foreman, experienced in character of work covered by Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Architect / Engineer and Department.
- F. Remove from project or take other corrective action upon notice from Architect / Engineer or Department for Contractor's employees whose work is considered by Architect / Engineer or Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.

- G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.
- H. Presence and observation of the Work by Architect / Engineer or Public Works Project Manager shall not relieve Contractor of any obligations.

14. WEATHER CONDITIONS

- A. In event of temporary suspension of work, or during inclement weather, or whenever Architect / Engineer shall direct, Contractor shall, and shall cause subcontractors to protect carefully all work and materials against damage or injury from weather. If, in opinion of Architect / Engineer or Department, any work or materials that have been damaged or injured due to failure on part of Contractor or any subcontractors so to protect the Work, such materials shall be removed and replaced at expense of Contractor.

15. PROTECTION OF WORK AND PROPERTY

- A. Contractor shall at all times safely guard County's property from injury or loss in connection with this Contract. Contractor shall at all times safely guard and protect the Work, and adjacent property, from damage. Contractor shall replace or make good any such damage, loss or injury unless such is caused directly by errors contained in Contract, or by County, or County's duly authorized representative.
- B. Contractor may act diligently, without previous instructions from Architect / Engineer and / or Department, in emergency that threatens loss or injury of property, or safety of life. Contractor shall notify Architect / Engineer and / or Department immediately thereafter. Promptly submit any claim for compensation by Contractor due to such extra work to Architect / Engineer and / or Department for approval as provided for in Article 18 herein.

16. INSPECTION AND TESTING OF MATERIALS

- A. Authorized representatives and agents of County government shall have access at all times to the Work wherever it is in preparation or progress and Contractor shall provide facilities for such access and for inspection.
- B. Should it be considered necessary or advisable at any time before final acceptance of the Work to make examination of work already completed, by removing or tearing out same, Contractor shall upon request, promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any aspect, due to fault of Contractor or subcontractors thereof, Contractor shall assume all expenses of such examination and of satisfactory reconstruction. Contractor will be reimbursed for such examination and replacement in accordance with Article 18 - A.3., of these General Conditions of Contract if such work is found to meet requirements of Contract.
- C. If Specifications, Architect / Engineer's, or Public Works Project Manager's instructions require any work to be specially tested or approved, Contractor shall give Architect / Engineer and Public Works Project Manager timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Architect / Engineer shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection

services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.

- D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

17. REPORTS, RECORDS AND DATA

- A. Contractor shall submit to Architect / Engineer and Public Works Project Manager such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, invoices, records and other data as either may request concerning work performed or to be performed under this Contract.

18. CHANGES IN THE WORK

- A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
1. Unit bid prices previously approved.
 2. Agreed lump sum based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) Add to cost under (2), fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit and any other general expense.
 - h) On that portion of the Work under (2) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense.
 - i) Department may require correct amount of costs with supporting vouchers; Contractor shall keep and present in such form as directed.
 3. Cost-plus work, with not-to-exceed dollar limit, based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work. Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) To cost under (3), there shall be added fixed fee to be agreed upon but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force.

Fee shall be compensation to cover cost of supervision, overhead, bond, profit, and any other general expense.

- h) On that portion of the Work under (3) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense.
 - i) Contractor shall keep and present, in such form as directed, correct amount of cost together with such supporting vouchers as may be required by Department.
- B. If Contractor claims that by any instructions given by Architect / Engineer, Department, by drawings or otherwise, regarding performance of the Work or furnishing of material under Contract, involves extra cost, Contractor shall give Department written notice of cost thereof within two (2) weeks after receipt of such instructions and in any event before proceeding to execute work, unless delay in executing work would endanger life or property.
- C. No claim for extra work or cost shall be allowed unless it was done in pursuance of written Change Order from Architect / Engineer and approved by Department, as previously mentioned, and claim presented with payment request submitted after changed or extra work is completed.
- D. Negotiation of cost for change in the Work shall not be cause for Contractor to delay prosecution of the Work if Contractor has been authorized in writing by Public Works Project Manager to proceed.

19. EXTRAS

- A. Without invalidating Contract, Department may order extra work or make changes by altering, adding to or deducting from the Work, contract sum being adjusted in accordance with Article 18 herein.

20. TIME FOR COMPLETION

- A. Contractor agrees that the Work shall be prosecuted regularly and diligently and complete the Work as stated in Construction Documents.

21. CORRECTION OF WORK

- A. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to inspection of Architect / Engineer and Public Works Project Manager who shall be judge of quality and suitability of the Work, materials, and processes of manufacture for purposes for which they are used. Should they fail to meet Architect / Engineer's and Public Works Project Manager's approval they shall be reconstructed, made good, replaced or corrected, by Contractor at Contractor's expense. Immediately remove all rejected material from site.
- B. If Contractor defaults or neglects to carry out the Work in accordance with Construction Documents or fails to perform any provision of Contract, Department may, after ten (10) business days' written notice to Contractor and without prejudice to any other remedy County may have, make good such deficiencies. In such case, appropriate Change Order shall be issued deducting from Contractor's payments then or thereafter, cost of correcting such deficiencies, including cost of Architect / Engineer's additional services made necessary by such default, neglect or failure.

22. SUBSURFACE CONDITIONS FOUND DIFFERENT

- A. If Contractor encounters subsurface or latent conditions at site materially differing from those shown on Drawings or indicated in Specifications, Contractor shall immediately give notice to Architect / Engineer and Public Works Project Manager of such conditions before they are disturbed. Architect / Engineer will thereupon promptly investigate conditions, and if Architect / Engineer finds that they materially differ from those shown on Drawings or indicated in Specifications, Architect / Engineer will at once make such changes as necessary, any increase or decrease of cost resulting from such changes to be adjusted in manner provided in above Article 18 entitled "Changes in the Work".

23. RIGHT OF DEPARTMENT TO TERMINATE CONTRACT

- A. In event that any provisions of this Contract are violated by Contractor or by any subcontractors, County may serve written notice upon Contractor and Surety of its intention to terminate Contract, such notice to contain reasons for such intention to terminate Contract, and unless within ten (10) business days after serving of such notice upon Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, Contract shall, upon expiration of said ten (10) business days, cease and terminate.
- B. In event of any such termination, County shall immediately serve notice thereof upon Surety and Contractor, and Surety shall have right to take over and perform Contract subject to County's approval; provided, however, that if Surety does not commence performance thereof within ten (10) business days from date of mailing to such Surety of notice of termination, County may take over the Work and prosecute same to completion by contract, or by force account, at expense of Contractor; Contractor and Surety shall be liable to County for any excess cost occasioned County thereby, and in such event County may take possession of and utilize in completing the Work, such materials and equipment as may be on the Work site and therefore necessary.

24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

- A. Contractor shall be responsible for Construction Schedule and coordination. Immediately after execution and delivery of Contract and before making first payment, Contractor shall notify all subcontractors to furnish all required information to develop Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
1. List of construction activities;
 2. Start, finish and time required for completion of each activity;
 3. Sequential relationships between activities;
 4. Identify all long lead-time items, key events, meetings or activities such as required submittals, fabrication and delivery, procurement of materials, installation and testing;
 5. Weekly definition of extent of work and areas of activity for each trade or Subcontract; and
 6. Other information as determined by Public Works Project Manager.
- B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.
- C. Progress Reporting:

1. Contractor shall update and publish Construction Schedule on monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by explanation of reasons for revision; and shall be subject to approval by Department.
 2. Failure of Contractor to keep Schedule in updated format shall result in County hiring firm specializing in construction schedule development and deducting those costs associated with updating process from payments due Contractor.
 3. Contractor shall submit show actual percentage of each activity completed, estimated future progress, and anticipated completion time.
- D. Responsibility for timely completion requires:
1. Contractor and subcontractors understand that performance of each is interdependent upon performance of others.
 2. Whenever it becomes apparent from current schedule, that phasing or progress completion dates will not be met, Contractor must take some or all following actions at no additional cost to County:
 - a) Increase construction labor in such quantities and crafts as will eliminate backlog of work.
 - b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
 - c) Reschedule work (yet remain in conformance with Drawings and Specifications).
 3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Manager.
- E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Architect / Engineer and Public Works Project Manager.

25. PAYMENTS TO CONTRACTOR

- A. Contractor shall provide:
1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
 2. Periodic itemized estimates of work done for purpose of making partial payments thereon.
- B. Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Manager. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.
- C. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month upon receipt of Application and Certificate for Payment form from Architect / Engineer and approval of Department.
- D. Contractor shall submit for approval first to Architect / Engineer, and then to Public Works Project Manager all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.

- E. Application and Certificate for Payment for preparatory work and materials delivered and suitably stored at site to be incorporated into the Work at some future period, will be given due consideration. Requesting payment for materials stored off site, may be rejected, however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered, conditional upon submission by Contractor of bills of sale, photographs and such other procedures as will adequately protect County's interest such as storage in bonded warehouse with adequate coverage. If there is any error in payment, Contractor is obligated to notify Department immediately, but no longer than ten (10) business days from receipt of payment.
- F. Payments by County will be due within forty-five (45) business days after receipt by Department of Application and Certificate for Payment.
- G. County will retain five percent (5%) of each Application and Certificate for Payment until final completion and acceptance of all the Work covered by Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at site, County will make remaining payments in full if Architect / Engineer and Public Works Project Manager find that progress of the Work corresponds with Construction Schedule. If Architect / Engineer and Public Works Project Manager find that progress of the Work does not correspond with Construction Schedule, County may retain up to ten percent (10%) of each Application and Certificate for Payment for the Work completed.
- H. All material and work covered by partial payments made shall become sole property of County, but this provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made, or restoration of any damaged work, or as waiver of right of County to require fulfillment of all of terms of Contract.
- I. County will make final payment within sixty (60) calendar days after final completion of the Work, and will constitute acceptance thereof. Submit Equal Benefits Compliance Payment Certification with final pay request. Payment may be denied if Certification is not included.
- J. County may make payment in full, including retained percentages and less authorized deductions, upon completion and acceptance of each Division where price is stated separately in Contract.
- K. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County, Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

26. WITHHOLDING OF PAYMENTS

- A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation sum of money deemed reasonably sufficient to pay any and all such lawful

claims until satisfactory evidence is furnished that all liabilities have been fully discharged; whereupon, payment to Contractor shall be resumed in accordance with terms of this Contract, but in no event shall these provisions be construed to impose any obligations upon County to either Contractor or Contractor's Surety.

- B. In paying any unpaid bills of Contractor, County shall be deemed agent of Contractor, and any payment so made by County, shall be considered as payment made under Contract by County to Contractor and County shall not be liable to Contractor for any such payment made in good faith.
- C. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of lawful demands of subcontractors, laborers, workers, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.
- D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- A. Making of final payment shall constitute waiver of all claims by County except those arising from:
 - 1. Unsettled lien;
 - 2. Faulty or defective work appearing after substantial completion;
 - 3. Failure of the Work to comply with requirements of Construction Documents; or
 - 4. Terms of any special guarantees required by Construction Documents.
- B. Acceptance of final payment shall constitute waiver of all claims by Contractor.

28. PAYMENTS BY CONTRACTOR

- A. Contractor shall pay following not later than fifth (5th) business day following each payment received from County:
 - 1. All transportation and utility services rendered;
 - 2. All materials, tools, and other expendable equipment that have been delivered at site of the Work to extent of ninety percent (90%) of cost thereof, and balance of cost thereof when said balance is paid to Contractor; and
 - 3. Each subcontractor, respective amount allowed Contractor because of work performed by subcontractor to extent of subcontractor's interest therein.

29. CONTRACT SECURITY

- A. Contractor shall furnish Performance and Payment Bonds in amount at least equal to one hundred percent (100%) of Contract price as security for faithful performance of this Contract and payment of all persons performing labor on project under this Contract and furnishing materials in connection with this Contract.
- B. Sample Performance and Payment Bonds that Contractor will be required to execute is bound into these Construction Documents. Before construction Contract is consummated, completed Performance and Payment Bonds must be approved by Department.

30. ASSIGNMENTS

- A. Contractor shall not assign whole or any part of this Contract or any moneys due or to become due hereunder without written consent of Department. In case Contractor assigns all or any part of any moneys due or to become due under this Contract, instrument of assignment shall contain clause substantially to effect that it is agreed that right of assignee in and to any moneys due or to become due to Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for performance of the Work called for in this Contract.

31. MUTUAL RESPONSIBILITY OF CONTRACTORS

- A. If, through acts of neglect on part of Contractor or any subcontractor shall suffer loss or damage on the Work, Contractor agrees to settle with such subcontractor by agreement or arbitration if such other subcontractor will so settle. If such subcontractor shall assert any claim against County on account of any damage alleged to have been sustained, Department shall notify Contractor, who shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives against any such claim.

32. SEPARATE CONTRACTS

- A. Department may award other contracts for the Work and all Contractors shall fully cooperate with each other and carefully adjust their work to that provided under other contracts as may be directed by Department. No Contractor shall commit or permit any act that will interfere with performance of the Work by any other Contractor.
- B. Contractor shall coordinate the Work with those of other Contractors. Cooperation will be required in arrangement for storage of materials and in detailed execution of the Work. Contractor, including subcontractors, shall keep informed of progress and detail work of others and shall notify Architect / Engineer or Department immediately of lack of progress or defective workmanship on part of others. Failure of Contractor to keep informed of the Work progressing on site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by Contractor of status of the Work as being satisfactory for proper coordination with Contractor's own work.

33. SUBCONTRACTS

- A. Contractor may use services of specialty subcontractors on those parts of the Work that, under normal contracting practices, are performed by specialty subcontractors.
- B. Contractor shall not award any work to any subcontractor without prior approval of Department. Qualifications of subcontractors shall be same as qualifications of Contractor. Request for subcontractor approval shall be submitted to Department fifteen (15) business days before start of subcontractor's work. If subcontractors are changed or added, Contractor shall notify Department in writing.
- C. Contractor shall be as fully responsible to County for acts and omissions of subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for acts and omissions of persons directly employed by Contractor.

- D. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to Contractor by terms of General Conditions of Contract and other Construction Documents insofar as applicable to work of subcontractors and to give Contractor same power as regards terminating any subcontract that Department may exercise over Contractor under any provision of Construction Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and County.
- F. Contractor shall insert in all subcontracts, Articles 26, 33, 43 and 45, respectively entitled: "Withholding of Payments", "Subcontracts", "Affirmative Action Provision and Minority / Women / Disadvantaged Business Enterprises", and "Minimum Wages", and shall further require all subcontractors to incorporate physically these same Articles in all subcontracts.

34. PUBLIC WORKS PROJECT MANAGER'S AUTHORITY

- A. Public Works Project Manager shall:
 - 1. Administer and ensure compliance with Construction Documents;
 - 2. Provide responsible on-site observations of construction and have authority to request work and to stop work whenever necessary to insure proper enforcement of Construction Documents;
 - 3. Convene and chair project meetings and foreman's coordination meetings when necessary to coordinate resolution of conflicts between Contractors, Architects, Engineers, Consultants, and Department; and
 - 4. Check and inspect material, equipment and installation procedures of all trades for proper workmanship and for compliance with Drawings, Specifications and Shop Drawings, permit no material on project site that is not satisfactory and reject work not in compliance with Construction Documents.

35. ARCHITECT / ENGINEER'S AUTHORITY

- A. Architect / Engineer is retained by, and is responsible to Department acting for County.
- B. Architect / Engineer shall determine amount, quality, acceptability, and fitness of several kinds of work and materials that are provided under this Contract and shall decide all questions that may arise in relation to said work and construction thereof.
- C. Architect / Engineer shall decide meaning and intent of any portion of Specifications and of any Drawings where they may be found obscure or be in dispute.
- D. Architect / Engineer shall provide responsible observation of construction. Architect / Engineer has authority to stop the Work whenever such stoppage may be necessary to insure proper execution of Construction Documents.
- E. Architect / Engineer shall be interpreter of conditions of Construction Documents and judge of its performance.
- F. Within reasonable time, Architect / Engineer shall make decisions on all matters relating to progress of the Work or interpretation of Construction Documents.
- G. Architect / Engineer's decisions are subject to review by Public Works Project Manager.

36. STATED ALLOWANCES

- A. Stated allowances enumerated in Instructions to Bidders shall cover net cost of materials or equipment, and all applicable taxes. Contractor's cost of delivery and unloading at site, handling costs on site, labor, installation costs, overhead, profit and any other incidental costs shall be included in Contractor's bid, but not as part of cash allowance.
- B. Department will solicit at least two (2) bids on materials or equipment for which allowance is stated and select on basis of lowest qualified responsible bid. Contractor will then be instructed to purchase "Allowed Materials". If actual price for purchasing "Allowed Materials", including taxes, is more or less than "Cash Allowance", Contract price shall be adjusted accordingly. Adjustment in Contract price shall not contain any cost items excluded from cash allowance.

37. ESTIMATES OF QUANTITIES

- A. Whenever estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of Construction Documents, they are given for use in comparing bids and right is especially reserved to increase or diminish them as they may be deemed reasonably necessary or desirable by Department to complete the Work included in this Contract, and cost for such increase or diminution shall be adjusted in manner provided for in General Conditions of Contract Article 18 entitled "Changes in the Work".

38. LANDS AND RIGHTS-OF-WAY

- A. Prior to start of construction, County shall furnish all land and rights-of-way necessary for carrying out and completion of the Work to be performed under this Contract.

39. GENERAL GUARANTEE

- A. Neither final certificate of payment nor any provision in Construction Documents nor partial or entire occupancy of premises by County shall constitute acceptance of work not done in accordance with Construction Documents or relieve Contractor of liability in respect to any expressed warranties or responsibility for faulty materials or workmanship.
 - 1. In no event shall making of any payment required by Contract constitute or be construed as waiver by County of any breach of covenants of Contract or waiver of any default of Contractor and making of any such payment by County while any such default or breach shall exist shall in no way impair or prejudice right of County with respect to recovery of damages or other remedy as result of such breach or default.
- B. Contractor shall remedy and make good all defective workmanship and materials and pay for any damage to other work resulting there from, which appear within period of one (1) year from date of substantial completion, providing such defects are not clearly due to abuse or misuse by County. Department will give notice of observed defects with reasonable promptness.
- C. Guarantee on work executed after certified date of substantial completion will begin on date when such work is inspected and approved by Architect / Engineer and Public Works Project Manager.

- D. Where guarantees or warranties are required in sections of Specifications for periods in excess of one (1) year, such longer terms shall apply; however, Contractor's Performance and Payment Bonds shall not apply to any guarantee or warranty period in excess of one (1) year.

40. CONFLICTING CONDITIONS

- A. Any provision in any of Construction Documents which may be in conflict or inconsistent with any Articles in these General Conditions of Contract or Supplementary Conditions shall be void to extent of such conflict or inconsistency.
- B. In case of ambiguity or conflict between Drawings and Specifications, Specifications shall govern.
- C. Printed dimensions shall be followed in preference to measurements by scale. Large-scale drawings take precedence over small-scale drawings. Dimensions on Drawings and details are subject to field measurements of adjacent work.

41. NOTICE AND SERVICE THEREOF

- A. Any notice to Contractor from Department relative to any part of this Contract shall be in writing and considered delivered and service thereof completed, when said notice is posted, by certified or registered mail, to Contractor at Contractor's last given address, or delivered in person to said Contractor, or Contractor's authorized representative on the Work.

42. PROTECTION OF LIVES AND HEALTH

- A. In order to protect lives and health of Contractor's employees under Contract, Contractor shall comply with all pertinent provisions of Wisconsin Administrative Code, Rules of Department of Commerce, relating to Safety and Health.
- B. Contractor alone shall be responsible for safety, efficiency and adequacy of Contractor's tools, equipment and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

43. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES

- A. Affirmative Action Provisions.
 - 1. During term of their Contract, Contractor agrees not to discriminate on basis of race, religion, color, sex, handicap, age, sexual preference, marital status, physical appearance, or national origin against any person, whether recipient of services (actual or potential), employee, or applicant for employment. Such equal opportunity shall include but not be limited to following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation or level of service(s). Contractor agrees to post in conspicuous places, these affirmative action standards so as to be visible to all employees, service recipients and applicants for this paragraph. Listing of prohibited bases for discrimination shall not be construed to amend in any fashion state or federal law setting forth additional bases and exceptions shall be permitted only to extent allowable in state or federal law.
 - 2. Contractor is subject to this Article only if Contractor has ten (10) or more employees and receives \$10,000.00 or more in annual aggregate contracts with County. Contractor shall file and Affirmative Action Plan with Dane County Contract Compliance Officer in

accord with Chapter 19 of Dane County Code of Ordinances. Such plan must be filed within fifteen (15) business days of effective date of this Contract and failure to do so by said date shall constitute ground for immediate termination of Contract by County.

Contractor shall also, during term of this Contract, provide copies of all announcements of employment opportunities to County's Contract Compliance Office, and shall report annually number of persons, by race, sex and handicap status, who apply for employment, and, similarly classified, number hired and number rejected.

3. Contact Dane County Contract Compliance Officer at Dane County Contract Compliance Office, 210 Martin Luther King, Jr. Blvd., Room 421, Madison, WI 53703, 608/266-4114.
4. In all solicitations for employment placed on Contractor's behalf during term of this Contract, Contractor shall include statement to affect Contractor is "Equal Opportunity Employer". Contractor agrees to furnish all information and reports required by County's Contract Compliance Officer as same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and provision of this Contract.

B. Minority / Women / Disadvantaged / Emerging Small Business Enterprises.

1. Chapter 19.508 of Dane County Code of Ordinances is official policy of Dane County regarding utilization of, to fullest extent of, Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs) Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs).
2. Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. List of subcontractors will be required of low bidder as stated in this Contract. List shall indicate which are MBEs / WBEs / DBEs / ESBEs and percentage of subcontract awarded, shown as percentage of total dollar amount of bid.

44. COMPLIANCE WITH FAIR LABOR STANDARDS

- A. During term of this Contract, Contractor shall report to County Contract Compliance Officer, within ten (10) business days, any allegations to, or findings by National Labor Relations Board (NLRB) or Wisconsin Employment Relations Commission (WERC) that Contractor has violated statute or regulation regarding labor standards or relations. If investigation by Contract Compliance Officer results in final determination that matter adversely affects Contractor's responsibilities under this Contract, and which recommends termination, suspension or cancellation of this Contract, County may take such action.
- B. Contractor may appeal any adverse finding by Contract Compliance Officer as set forth in Dane County Ordinance 25.015(11)(c) through (e).
- C. Contractor shall post this statement in prominent place visible to employees: "As condition of receiving and maintaining contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation or union organizing."

45. DOMESTIC PARTNERSHIP BENEFITS

- A. Contractor agrees to provide same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or cash equivalent if such benefit cannot reasonably be provided. Contractor agrees to make available for County inspection Contractor's payroll records relating to employees providing services on or under this Contract or subcontract. If any payroll records of Contractor contain any false, misleading or fraudulent information, or if Contractor fails to comply with provisions of Chapter 25.016,

Dane County Ordinances, contract compliance officer may withhold payments on Contract; terminate, cancel or suspend Contract in whole or in part; or, after due process hearing, deny Contractor right to participate in bidding on future County contracts for period of one year after first violation is found and for period of three years after second or subsequent violation is found.

46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE

- A. Contractor agrees to use and occupancy of portion or unit of the Work before formal acceptance by Department, provided Department:
 - 1. Secures written consent of Contractor; except when in opinion of Public Works Project Manager, Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements.
 - 2. Secures endorsement from insurance carrier and consent of Surety permitting occupancy of building or use of the Work during remaining period of construction, or, secures consent of Surety.
 - 3. Assumes all costs and maintenance of heat, electricity and water.
 - 4. Accepts all work completed within that portion or unit of the Work to be occupied, at time of occupancy.

47. MINIMUM WAGES

- A. Contractor shall post, at appropriate conspicuous point on site of project, schedule showing all determined minimum wage rates for various classes of laborers and mechanics to be engaged in the Work under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by laborers and mechanics so engaged.
- B. Supplementary Conditions section in Construction Documents lists wage determinations required by State Law.
- C. If, after award of Contract, it becomes necessary to employ any person in trade or occupation not classified in wage determinations, such person shall be paid at not less than such rate as shall be determined by Wisconsin Department of Workforce Development. Such approved minimum rate shall be retroactive to time of initial employment of such person in such trade or occupation. Contractor shall notify Department of Contractor's intention to employ persons in trades or occupations not so classified in sufficient time for Department to obtain approved rates for such trades or occupations.
- D. Specified wage rates are minimum rates only, and Department will not consider any claims for additional compensation made by Contractor because of payment by Contractor of any wage rate in excess of applicable rate contained in this Contract. Contractor shall adjust any disputes in regard to payment of wages in excess of those specified in this Contract.
- E. Submit required affidavit(s) to Department of Public Works, Highway & Transportation, as requested and with final application for payment for work under said contract. Affidavit(s) shall clearly indicate name, trade or occupation, and paid wages of every laborer, worker or mechanic employed by Contractor and all subcontractors during billing period including accurate record of number of hours worked by each employee and actual wages paid as stipulated in Wisconsin Statute 66.0903. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate

Determination is not required for this Work, use “Dane County, Wisconsin Contractor Wage Affidavit”. Forms of such affidavits are included in Supplementary Conditions.

48. CLAIMS

- A. No claim may be made until Department’s Assistant Public Works Director has reviewed Architect / Engineer’s decision as provided for in Article 35 of General Conditions of Contract. If any claim remains unresolved after such review by Department’s Assistant Public Works Director the claim may be filed under Wisconsin Statute 893.80. Work shall progress during period of any dispute or claim. Unless specifically agreed between parties, venue will be in Dane County, Wisconsin.

49. ANTITRUST AGREEMENT

- A. Contractor and County recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by County. Therefore, Contractor hereby assigns to County any and all claims for such overcharges as to goods and materials purchased in connection with this Contract, except as to overcharges which result from antitrust violations commencing after price is established under this Contract and any change order thereto.

50. INSURANCE

- A. Contractor Carried Insurance:
 - 1. Contractor shall not commence work under this Contract until Contractor has obtained all insurance required under this Article and has provided evidence of such insurance to Risk Manager, 425 City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703. Contractor shall not allow any subcontractor to commence work until insurance required of subcontractor has been so obtained and approved. Company providing insurance must be licensed to do business in Wisconsin.
 - 2. Worker’s Compensation Insurance:
 - a) Contractor shall procure and shall maintain during life of this Contract, Worker’s Compensation Insurance as required by statute for all of Contractor’s employees engaged in work at site of project under this Contract and, in case of any such work sublet, Contractor shall require subcontractor similarly to provide Worker’s Compensation Insurance for all of latter’s employees to be engaged in such work unless such employees are covered by protection afforded by Contractor’s Worker’s Compensation Insurance.
 - b) If any claim of employees engaged in hazardous work on project under this Contract is not protected under Worker’s Compensation Statute, Contractor shall provide and shall cause each subcontractor to provide adequate Employer’s Liability Insurance for protection of such of Contractor’s employees as are not otherwise protected.
 - 3. Contractor’s Public Liability and Property Damage Insurance:
 - a) Contractor shall procure and maintain during life of this Contract, Contractor’s Public Liability Insurance and Contractor’s Property Damage Insurance in amount not less than \$1,000,000 bodily injury, including accidental death, to any one person, and subject to same limit for each person, in amount not less than \$1,000,000 on account of one accident, and Contractor’s Property Damage Insurance in amount not less than \$1,000,000 or combined single limit of at least \$1,000,000 with excess coverage over and above general liability in amount not less than \$5,000,000. Contractor shall add “Dane County” as additional insured for each project.
 - b) Contractor’s Public Liability and Property Damage Insurance shall include Products, Completed Operation, and Contractual Liability under Insurance Contract.

“Contractor shall in all instances save, defend, indemnify and hold harmless County and Architect / Engineer against all claims, demands, liabilities, damages or any other costs which may accrue in prosecution of the Work and that Contractor will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as result of Contractor’s operations” and each shall be listed as additional insured on Contractor’s and sub-contractors’ insurance policies.

- c) Obligations of Contractor under Article 50.A.2.b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
 - 1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
 - 2) Giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
- d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 each accident single limit, bodily injury and property damage combined with excess coverage over and above general liability in amount not less than \$5,000,000.
- e) Contractor shall either:
 - 1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor’s Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
 - 2) Insure activities of subcontractors in Contractor’s own policy.
- 4. Scope of Insurance and Special Hazards: Insurance required under Article 50.A.2 & 50.A.3. hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
- 5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and “Dane County” listed as additional insured. Such certificates shall also contain (substantially) following statement: “Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) business days written notice has been received by Risk Manager.”

B. Builder’s Risk:

- 1. County shall provide Builder’s Risk insurance coverage for its insurable interests in construction or renovation projects with completed value of \$500,000 or less. Therefore, if project completed value is more than \$500,000, Contractor shall obtain and maintain in force, at its own expense, Builder’s Risk Insurance on all risks for amount equal to full completed value of covered structure or replacement value of alterations or additions. Any deductible shall not exceed \$25,000 for each loss. Policy shall include occupancy clause and list Dane County as loss payee.

C. Indemnification / Hold Harmless:

- 1. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from and against all claims, damages, losses and expenses including attorneys’ fees arising out of or resulting from performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, and is caused in whole or in part by any act or omission of Contractor, any subcontractor,

- anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by part indemnified hereunder.
2. In any and all claims against Dane County, its boards, commissions, agencies, officers, employees and representatives or by any employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, indemnification obligation under this Contract shall not be limited in any way by any limitation on amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts.
 3. Obligations of Contractor under this Contract shall not extend to liability of Architect / Engineer, its agents or employees arising out of:
 - a) Preparation or approval of maps, drawings, opinion, reports, surveys, change orders, designs or specifications; or
 - b) Giving of or failure to give directions or instruction by Architect / Engineer, its agents or employees provided such giving or failure to give is primary cause of injury or damage.
 4. Dane County shall not be liable to Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties.


51. WISCONSIN LAW CONTROLLING

- A. It is expressly understood and agreed to by parties hereto that in event of any disagreement or controversy between parties, Wisconsin law shall be controlling.

SUPPLEMENTARY CONDITIONS

1. APPLICATION & CERTIFICATE FOR PAYMENT

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit partial and final Application & Certificate for Payment for work under said contract. Form shall provide similar information as shown on AIA G702™ and G703™ forms (samples shown below). Forms shall be submitted to Public Works Project Manager for approval.


AIA Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO:	Distribution to:
FROM CONTRACTOR:	VIA ARCHITECT:	PERIOD TO:	OWNER <input type="checkbox"/>
		CONTRACT FOR:	ARCHITECT <input type="checkbox"/>
		CONTRACT DATE:	CONTRACTOR <input type="checkbox"/>
		PROJECT NOS:	FIELD <input type="checkbox"/>
			OTHER <input type="checkbox"/>

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. AIA Document G703™, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM \$ _____

2. NET CHANGE BY CHANGE ORDERS \$ _____

3. CONTRACT SUM TO DATE (Line 1 + 2) \$ _____

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ _____

5. RETAINAGE:

a. _____ % of Completed Work
(Columns D + E on G703) \$ _____

b. _____ % of Stored Material
(Column F on G703) \$ _____

Total Retainage (Lines 5a + 5b, or Total in Column I of G703) \$ _____

6. TOTAL EARNED LESS RETAINAGE \$ _____
(Line 4 minus Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT \$ _____
(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE \$ _____

9. BALANCE TO FINISH, INCLUDING RETAINAGE \$ _____
(Line 3 minus Line 6)

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:
By: _____ Date: _____
State of: _____
County of: _____
Subscribed and sworn to before me this _____ day of _____

Notary Public:
My commission expires: _____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$ _____	\$ _____
Total approved this month	\$ _____	\$ _____
TOTAL	\$ _____	\$ _____
NET CHANGES by Change Order	\$ _____	

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ _____
(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:
By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

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Continuation Sheet

AIA Document G702™-1992, Application and Certificate for Payment, or G732™-2009, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. In tabulations below, amounts are in US dollars. Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED <i>(Not in D or E)</i>	G TOTAL COMPLETED AND STORED TO DATE <i>(D+E-F)</i>	H BALANCE TO FINISH <i>(C-G)</i>	I RETAINAGE <i>(if variable rate)</i>
			FROM PREVIOUS APPLICATION <i>(D-E)</i>	THIS PERIOD				
GRAND TOTAL								

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

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2. CONTRACTOR WAGE AFFIDAVIT

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit in form as hereinafter set forth in this section. Affidavit affirms that all persons employed by contractor or by any of contractor's subcontractors on such contract have been paid no less than minimum wages established under Dane County Ordinances, Chapter 40, Subchapter H (Minimum Wage Ordinance) and in effect at date of execution of contract, that full payment of wages earned has been made, and that no rebates either directly or indirectly have been made. Form of such affidavit is included in this section.
- B. Form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

3. INSURANCE

A. **Contractor Carried Insurance.** In order to protect itself and the County, Contractor shall not commence work under this Contract until obtaining all required insurance and the County has approved such insurance. Contractor shall not allow any subcontractor to commence work on subcontract until insurance required of subcontractor has been so obtained and approved.

1. **Pollution Insurance Policy**

Contractor shall procure and maintain during life of this Contract, Pollution Insurance Policy in amount of at least \$1,000,000 per occurrence, \$5,000,000 aggregate.

SAMPLE ONLY -
NOT FOR
SUBMITTAL

SECTION 01 00 00
BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SECTION SUMMARY

- A. Section Includes:
1. Section Summary
 2. Summary of the Work
 3. Contractor Use of Premises
 4. Applications for Payment
 5. Change Procedures
 6. Alternates
 7. Coordination
 8. Cutting and Patching
 9. Conferences
 10. Progress Meetings
 11. Submittal Procedures
 12. Proposed Products List
 13. Shop Drawings
 14. Product Data
 15. Samples
 16. Manufacturers' Instructions
 17. Manufacturers' Certificates
 18. Quality Assurance / Quality Control of Installation
 19. References
 20. Interior Enclosures
 21. Protection of Installed Work
 22. Parking
 23. Staging Areas
 24. Occupancy During Construction and Conduct of Work
 25. Protection
 26. Progress Cleaning
 27. Products
 28. Transportation, Handling, Storage and Protection
 29. Product Options
 30. Substitutions
 31. Starting Systems
 32. Demonstration and Instructions
 33. Contract Closeout Procedures
 34. Final Cleaning
 35. Adjusting
 36. Operation and Maintenance Data
 37. Spare Parts and Maintenance Materials
 38. As-Built and Record Drawings and Specifications

1.2 SUMMARY OF THE WORK

- A. Project Description: Perform the Work as specified and detailed in the Construction Documents. Contractor to provide renovations, site improvements and associated MEP. In general, the Work consists of renovations to the first floor, including partial removal of existing foundation at existing doors; new concrete slab with radiant heating; new gypsum board; new doors; upgrade of door hardware and sills for ADA compliance; new public restrooms; new louver to replace existing window; new glass block window; stubbing out MEP for future kitchenette; new drinking fountains; fire extinguisher and cabinet; new fire sprinkler system; new driveway and parking lot; site work, including site drainage, utilities, prep for future construction; first floor ceiling infill; insulation; and MEP/FP upgrades as required for renovation work.
- B. Work shall be complete, including appurtenances, all as shown on the Project Drawings and specified in the Project Manual. Labor, materials, products, equipment, transportation, services and the like shall be provided in quantities to complete the Project. Singular specifications shall be considered plural where they apply. Color selections and finishes not specified in the Project Manual shall be “by Others” and submitted to the Architect for review.
- C. Work by Owner:
 - 1. Not Applicable
- D. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy.
- E. Diggers Hotline:
 - 1. It is General Contractor’s responsibility to contact Diggers Hotline to have all utility locations marked prior to excavation and planning an excavation in a timely manner so as not to delay the Work.
 - 2. Diggers Hotline shall also be used to obtain information on safe working clearances from overhead lines.
 - 3. Completely comply with all requirements of each affected utility company.
 - 4. It is General Contractor’s responsibility to contact & hire private utility locating services if necessary.

1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow work by Contractors or Subcontractors and access by Owner.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit two (2) original copies with “wet” signatures of each application on AIA G702™ and G703™ forms or approved contractors invoice form.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

- C. Payment Period: Monthly.
- D. Submit Applications for Payment to Architect / Engineer for initial approval. Architect / Engineer will forward approved copies to Owner who will also approve & process for payment.

1.5 CHANGE PROCEDURES

- A. Contractor's costs for Products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from contingency allowance.

1.6 ALTERNATES

- A. Alternates quoted on Bid Form and listed in Section 01 23 00. Alternates shall be reviewed and accepted or rejected at Owner's option.
- B. Coordinate related work and modify surrounding work as required.

1.7 COORDINATION

- A. Coordinate scheduling, submittals, and work of various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work that are indicated diagrammatically on Drawings.
- D. Public Works Project Engineer may choose to videotape site or workers as the Work progresses.

1.8 CUTTING AND PATCHING

- A. Employ a skilled and experienced installer to perform cutting and patching new work; restore work with new Products.
- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- D. Refinish surfaces to match adjacent finishes.

1.9 CONFERENCES

- A. There will be pre-bid conference for this project; see Instructions to Bidders.
- B. Owner will schedule a pre-construction conference after Award of Contract for all affected parties.
- C. Contractor shall submit Construction Schedule at pre-construction meeting.
- D. When required in individual Specification section, convene a pre-installation conference at project site prior to commencing work of Section.

1.10 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at minimum of one (1) per week (unless by agreement with all parties), with Public Works Project Engineer
- B. Preside at meetings, record minutes, and distribute copies within two (2) business days to those affected by decisions made.

1.11 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Construction Documents references.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Construction Documents.
- C. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of completing the Work.
- D. Revise and resubmit submittals as required; identify all changes made since previous submittal.

1.12 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) business days after date of Award of Contract, submit complete list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

1.13 SHOP DRAWINGS

- A. Submit number of copies that Contractor requires, plus three (3) copies that shall be retained by Public Works Project Manager.

1.14 PRODUCT DATA

- A. Submit number of copies that Contractor requires, plus two (2) copies that shall be retained by Public Works Project Manager.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

1.15 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of Product.
- B. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Public Works Project Manager's selection.

1.16 MANUFACTURERS' INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.17 MANUFACTURERS' CERTIFICATES

- A. When specified in individual Specification sections, submit manufacturers' certificate to Public Works Project Manager for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.18 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.19 REFERENCES

- A. Conform to reference standard by date of issue current as of date for receiving bids.
- B. Should specified reference standard conflict with Construction Documents, request clarification from Public Works Project Manager before proceeding.

1.20 INTERIOR ENCLOSURES

- A. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent distribution of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1.21 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual Specification sections.

1.22 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel. Parking shall be available at the Work site for personnel and work vehicles.

1.23 STAGING AREAS

- A. Coordinate staging areas with Public Works Project Manager prior to starting the Work.
- B. On-site space for use as staging areas and storage of materials is limited and will be apportioned among various Contractors as their needs dictate with due regard for storage requirements of each Contractor. Each Contractor shall be responsible for safety of equipment and materials that are stored on site.

1.24 OCCUPANCY DURING CONSTRUCTION AND CONDUCT OF WORK

- A. Areas of existing site will be occupied during period when the Work is in progress. Work may be done from (7:00 am to 7:00 pm), but confer with Owner, schedule work and store materials so as to interfere as little as possible with normal use of premises.
- B. Work shall be done and temporary facilities furnished so as not to interfere with access to any occupied area and so as to cause least possible interference with normal operation of site or any essential service thereof.
- C. Contractor shall, at all times, provide approved, safe walkways and site entrances for use by Owner, employees and public.
- D. Contractor shall provide adequate protection for all parts of site, its contents and occupants wherever the Work under this Contract is to be performed.
- E. Contractor is not responsible for providing & maintaining temporary toilet facilities.
- F. Each Contractor shall arrange with Owner to make necessary alterations, do new work, make connections to all utilities, etc., at such times as will not cause interruption of utility services to facility. Contractor doing this work shall protect, cap, cut off and / or replace and relocate existing pipes, electrical work and other active utilities encountered which may interfere with new construction work.

- G. New work in extension of existing work shall correspond in all respects with that to which it connects or similar existing work unless otherwise indicated or specified.
 - 1. Existing work shall be cut, altered, removed or replaced as necessary for performance of Contract obligations.
 - 2. Work remaining in place, damaged or defaced by reason of work done under this Contract shall be restored equal to its condition at time of Award of Contract.
 - 3. If removal of work exposes discolored or unfinished surfaces or work out of alignment, such surfaces shall be refinished or materials replaced as necessary to make continuous work uniform and harmonious.

1.25 PROTECTION

- A. Contractor shall protect from injury all trees, shrubs, hedges, walks and driveways and pay for any damage to same resulting from insufficient or improper protection.
- B. Contractor shall provide and maintain barricades & signage to prohibit public access to construction site.

1.26 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

1.27 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by Construction Documents.

1.28 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

1.29 PRODUCT OPTIONS

- A. Where definite material is specified, it is not intentional to discriminate against "equal" product made by another manufacturer. Intention is to set definite standard of material quality. Should bidder choose to bid materials other than those specified, bidder shall submit said materials specifications to Public Works Project Manager for approval at least seven (7) business days prior to Bid Due Date.
- B. Products and materials that are not specified, but have been approved for use by Public Works Project Manager shall be identified in addenda to all bidding contractors.

- C. Requests for material or product substitutions submitted after Bid Due Date may be considered. Owner reserves right to approve or reject substitutions based on Specification requirements and intended use.

1.30 SUBSTITUTIONS

- A. Public Works Project Manager shall consider requests for Substitutions only within fifteen (15) calendar days after date of Public Works Construction Contract.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
- C. Submit three (3) copies of requests for Substitution for consideration. Limit each request to one (1) proposed Substitution.
- D. Substitutions shall not change contract price established at Bid Due Date.

1.31 STARTING SYSTEMS

- A. Provide written notification prior to start-up of each equipment item or system.
- B. Ensure that each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.32 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.
- C. Owner may choose to videotape demonstration session; demonstration and demonstrator shall be to level of satisfaction of Owner.

1.33 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Construction Documents have been reviewed, the Work has been inspected, and the Work is complete in accordance with Construction Documents and ready for Public Works Project Manager's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Sum / Price, previous payments, and amount remaining due.

1.34 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior surfaces exposed to view.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.35 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.36 OPERATION AND MAINTENANCE MANUAL

- A. Provide operation and maintenance manual for all mechanical and electrical equipment and systems supplied and installed in the Work.

1.37 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
- B. Deliver to the Work site and place in location as directed.

1.38 AS-BUILT AND RECORD DRAWINGS AND SPECIFICATIONS

- A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Architect / Engineer with original marked up redlines of Construction Documents' drawings and specifications that shall include all Addendums, Change Orders, Construction Bulletins, on-site changes, field corrections, etc. These are project As-Built Drawings & Specifications.
- B. Architect / Engineer shall update original Construction Documents to include all Addendums & any other changes including those provided by Contractor in As-Built Drawings & Specifications. These updates are project Record Drawings & Specifications.
- C. Architect / Engineer shall furnish Public Works Project Manager with Record Drawings as detailed in Professional Services Agreement.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the alternates to the project. Refer to the Product/Execution Articles of the Contract Documents for information pertaining to the work of each alternate.
- B. Each proposal under an alternate shall include all incidental work and all adjustments necessary to accommodate the changes. All work shall meet the requirements of the Contract Documents.
- C. Each alternate proposal shall be submitted as an individual cost for the particular alternate and shall be proposed under the premise that no other alternates have been accepted. Should the work of an alternate called for by the Bid Form not affect the cost of the work, "No Change" shall be stated.
- D. Owner may, at his option, vary the scope of the work by authorizing alternates which will add to the work, deduct from the work or substitute materials, equipment or methods.
- E. Immediately following Award of Contract, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates, if any.

1.2 ALTERNATES

- A. Alternate #1 – State the amount to be added to the base bid for all work associated with installing colored concrete in Gathering Space 100 and Kitchenette 105. Base bid is for sealed concrete for these two rooms.
- B. Alternate #2 – State the amount to be added to the base bid for all work associated with furnishing and installing in the kitchenette 105:
 - 1. Cabinetry equivalent to Dura Supreme® Homestead Panel Full Overlay in hickory wood species in natural finish,
 - 2. Plastic laminate countertop,
 - 3. Elkay® Lustertone stainless steel 33" x 22" x 6-1/2" equal double bowl top mount sink model LRAD332265PD with Moen® Belfield two-handle faucet model 7250 in spot resistant stainless finish, and electrical light fixture D.

Base bid has these items furnished and installed by Others.

- C. Alternate #3 – State the amount to be added to the base bid to furnish and install low voltage wiring and devices from the phone and data outlets to the phone and data service location in Mechanical Room 103; to furnish and install low voltage wiring from electric door strike E100 and E102 to Office 104 west wall location and to provide the software system with training for controlling the locking and unlocking of these doors. Base bid is for these items to be furnished and installed by Others.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 57 13

CONSTRUCTION SITE EROSION CONTROL

PART 1 - GENERAL

1.01 Section Includes

- A. Furnishing, installing, maintaining, and removing erosion and sediment control facilities and measures.
- B. The contractor is responsible for providing all erosion control facilities and measures necessary to control erosion and sedimentation at the work site. These facilities and measures may or may not be shown on the Drawings and their absence on the Drawings does not alleviate the contractor from providing them. Any measures and facilities shown on the Drawings are the minimum actions required.

1.02 References

- A. WDNR Technical Standards - See DNR website @ <http://dnr.state.wi.us/org/water/wm/nps/stormwater/techstds.htm>.
- B. Wisconsin Department of Transportation, Erosion Control, Product Acceptability Lists for Multi-Modal Applications PAL, Current Edition.

1.03 General

- A. Requirements of WDNR Technical Standards shall be followed at all times.
- B. Use surface water and erosion control facilities and measures throughout the duration of the construction activity to control the movement of surface water and to reduce the potential for erosion. Maintain the facilities and measures until permanent vegetation is established.
- C. Eroded soil material shall not be allowed to leave the construction site or to enter a waterway, lake, or wetland.
- D. The Contractor shall be responsible for furnishing, installing, and maintaining the erosion control facilities, and in general, shall use construction practices that minimize erosion.
- E. Eroded material that has left the construction site shall be collected and returned to the site by the Contractor.
- F. Prevent construction site tracking with graveled roads, access drives, and parking areas of sufficient width and length to prevent sediment from being tracked onto public and private roadways. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before the end of each workday.

1.04 Sequencing and Scheduling

- A. Construct and stabilize erosion control measures for diversions or outlets prior to any grading or disturbance of the construction site.
- B. Install filter fabric and straw bale fences and barriers prior to disturbing the area.
- C. Turf areas that have been completed to finish grade shall be stabilized with permanent seeding within seven days. Turf areas where activity has ceased and that will remain exposed for more than 20 days before activity resumes and soil stockpiles shall be stabilized with temporary seeding or soil stabilizer.
- D. Other erosion control measures shall be in place prior to disturbance of the construction site, as applicable.

PART 2 - PRODUCTS

2.01 Silt Fence

- A. Fabric shall be a woven or nonwoven polyester, polypropylene, stabilized nylon, or polyethylene geotextile with the following minimum properties:

Property	Test Method	Requirement*
Grab tensile strength, lbs min. Machine direction Cross direction	ASTM D4632	120 100
Max. Apparent opening size, US Sieve	ASTM D 4751	No. 30
Permittivity, sec ⁻¹ , min.	ASTM D4491	0.05
Min. UV stability at 500 Hrs, %	ASTM D4355	70%

* Minimum or maximum average roll values.

2.02 Straw Bales

- A. Straw or hay bales in good condition with nominal dimensions of 14"W x 18"H x 30"L.
- B. Stakes: Wood stakes with minimum nominal dimension of 2" x 2" x 30".

2.03 Sediment Logs

- A. Wood excelsior log wrapped in biodegradable fabric or mesh and listed in the Erosion Control Product Acceptability Lists.
- B. Stakes: Wood stakes with minimum nominal dimension of 1" x 1" x 24".

2.04 Temporary Seed

- A. Areas needing protection during periods when permanent seeding is not applied shall be seeded with annual species for temporary protection. Provide species as follows:

Species	% Purity
Oats	98
Cereal Rye	97
Winter Wheat	95
Annual Ryegrass	97

- B. Provide oats for spring and summer. Provide cereal rye, winter wheat, or annual ryegrass for fall seeding.

2.05 Erosion Mat

- A. All erosion mat products shall be of the class and type indicated and shall be chosen from the Erosion Control Product Acceptability Lists.
- B. Class I: A short-term duration (six months or greater), light duty, organic mat. Netting shall be non-organic, photodegradable or biodegradable netting. The weight of the netting shall not exceed 15% of the total blanket weight. The netting shall be sufficiently bonded to the parent material to prevent separation for the life of the product.
 1. Type A: A netted product for use on slopes 2.5 to 1 or flatter with a minimum product permissible shear stress of 50 Pa (1.0 lbs/ft²). Not to be used in channels.
 2. Type B: A double netted product for use on slopes 2 to 1 or flatter or in channels with a minimum product permissible shear stress of 70 PA (1.5 lbs/ft²).
- C. Class II: A long-term duration (3 years or greater), organic mat. The weight of the netting shall not exceed 15% of the total blanket weight. The netting shall be bonded sufficiently to the parent material to prevent separation of the net from the parent material for the life of the product.
 1. Type A: Jute fiber only to be used for reinforcing sod.
 2. Type B: For use on slopes 2:1 or flatter, or in channels with a minimum product permissible shear stress of 95 Pa (2.0 lbs/ft²). Non-organic, photodegradable, or biodegradable netting allowed.

3. Type C: For use on slopes 2:1 or flatter, or in channels with a minimum product permissible shear stress of 95 Pa (2.0 lbs/ft²). Only 100% organic fibers allowed. Woven mats are allowed with a maximum opening of ½ inch. Use in environmentally sensitive areas that have a high probability of entrapping animals in the plastic netting.

D. Staples: U-shaped No. 11 gauge or greater wire with a span width of one to two inches and a length of not less than 6 inches for firm soil and 12 inches for loose soil.

2.06 Soil Stabilizer

A. Soil stabilizer shall be a polyacrylamide (PAM) and calcium solution intended to reduce the erodibility of bare soils. The product shall achieve an 80% reduction in soil loss induced by a two inch per hour rainfall simulator.

B. PAM mixtures shall be environmentally benign, harmless to fish, aquatic organisms, wildlife, and plants. Only anionic PAM will be permitted.

C. Anionic PAM, in pure form shall have no more than 0.05% free acrylic monomer by weight, as established by the Food and Drug Administration and the Environmental Protection Agency. The anionic PAM in pure form shall not exceed 200 pounds per batch.

D. The product provided shall be listed in the WisDOT PAL for Type B Soil Stabilizer.

2.07 Inlet Protection

A. Type A: Use around field inlets until permanent stabilization methods have been established. Use on pavement inlets prior to installation of curb and gutter or pavement.

B. Type B: Use on inlets without curb head after casting and grate are in place.

C. Type C: Use on street inlets with curb head.

D. Type D: Use in areas where other typed of inlet protection are incompatible with roadway and traffic conditions causing possible safety hazards when ponding occurs at inlet.

E. Geotextile: Type FF meeting the requirements of the latest edition of WisDOT PAL.

PART 3 - EXECUTION

3.01 Installation of Diversions

A. Temporary diversions shall be designed and installed in accordance with WDNR Conservation Practice Standard, Construction Site Diversion (1066).

3.02 Installation of Silt Fence and Straw Bale Barriers

A. Install straw bale barriers and sediment logs in accordance with the Drawings and WDNR Conservation Practice Standard, Sediment Bale Barrier (1055).

B. Install silt fence in accordance with the Drawings and WDNR Conservation Practice Standard, Silt Fence (1056).

C. Silt fence and straw bale barriers shall be placed on the contour to the extent practicable. Place fences parallel to the slope with the ends of the fence turned upslope a distance of one to two feet. The parallel spacing shall not exceed the maximum slope lengths as indicated in the following Table:

Fence and Barrier Spacing			
Slope	Spacing		
<2%	100'		
2 - 5%	75'		
5 - 10%	50'		
10 - 33%	25'		
>33%	20'		

3.03 Temporary Seeding

- A. Provide a seedbed of loose soil to a minimum depth of 2 inches.
- B. Apply seed evenly at the rate shown in the following table. Rake or drag to cover the seed to a depth of 1/4 inch.

Species	Lbs./Acre
Oats	131
Cereal Rye	131
Winter Wheat	131
Annual Ryegrass	80

3.04 Erosion Mat Installation

- A. Remove stones, clods, sticks, or other foreign material that would damage the mat or interfere with the mat bearing completely on the surface.
- B. Install erosion mat in accordance with the manufacturer’s recommendations.
- C. After seeding has been completed, roll blankets out parallel to the direction of water flow, with the netting on top. Spread the blankets without stretching, making sure the fibers are in contact with the soil. Overlap adjacent strips in accordance with the manufacturer’s recommendations. Overlap strip ends a minimum of 10 inches with the upgrade strip on top. Bury the upgrade end of each strip in a vertical trench at least 6 inches deep.
- D. Staple the mat strips in accordance with the manufacturer’s recommendations. Staple longitudinal overlaps and outer edges at maximum intervals of 3 feet. Staple strip ends at maximum intervals of 16 inches. Place staples throughout the mat at maximum 3-foot intervals. Insert staples flush with the ground surface.

3.05 Soil Stabilizer

- A. The manufacturer shall provide detailed written instructions on the storage, mixing, and application procedures.
- B. The soil stabilizer may be applied by spraying or by dry spreading.
- C. Application Rates: Apply at the rate recommended by the manufacturer.
- D. Do not apply within 30 feet of body of water (i.e. lake, river, stormwater pond).

3.06 Ditch Erosion Control

- A. The following erosion control measures are minimum requirements for all ditches. The Drawings may include more specific measures.

Ditch Erosion Control		
Slope Range	Method	Bale Checks
0 - 1%	Seed and mulch	None
1% - 4%	Seed and mulch with erosion mat	1% - 2%; Every 200' 2% - 4%; Every 100'
4% - 6%	Staked sod	Every 75'
>6%	Staked sod and/or riprap as specified by Engineer on Drawings	Every 75' for sod

- B. Stone Ditch Checks: Unless otherwise indicated on the Drawings, install stone ditch checks at intervals of one ditch check for every two feet of drop in channel grade.

3.07 Installation of Sod in Ditches

- A. Lay sod so that joints of abutting ends of strips are not continuous. Lay each strip snugly against previously laid strips.
- B. Roll or firmly tamp sod to press the sod into the underlying soil.
- C. Turn the upper edges of the strips into the soil.
- D. Stake strips along the longitudinal axis at 18-inch intervals and near the top edge of the strip. Provide wood lath or similar stakes, 12 inches long. Leave top of stake approximately 1/2 inch above sod surface.

3.08 Installation of Other Facilities

- A. Inlet protection barriers, channel stabilization, grassed waterways, rock lined waterways, sediments traps, sediment basins, and other forms of erosion control measures shall be designed and installed in accordance with *WDNR Technical Standards*.

3.09 Maintenance

- A. Inspect diversions within 24 hours after each rainfall or daily during periods of prolonged rainfall, until the vegetative cover is stabilized. Make necessary repairs immediately.
- B. Inspect filter fabric fences and barriers within 24 hours after each rainfall or daily during periods of prolonged rainfall. Necessary repairs or replacement shall be made immediately. Remove sediment deposits when deposits reach one-half the height of the fence. Follow manufacturer's recommendations for replacing fabric due to weathering.
- C. Inspect straw bale fences and barriers within 24 hours after each rainfall or daily during periods of prolonged rainfall. Necessary repairs or replacement shall be made immediately. Remove sediment deposits when deposits reach one-third the height of the bales. Replace bales after three months.
- D. Inspect all seeding, sod, mulches, mats and nets within 24 hours after each rainfall or daily during periods of prolonged rainfall. Additional mulch, netting or matting shall be applied immediately when necessary to maintain suitable coverage. Make inspections until vegetative cover is established. Water seeding and sod when necessary to promote establishment.
- E. All other soil erosion control measures should be inspected and repaired immediately, if required, within 24 hours after storm event or daily during periods of prolonged rainfall.

3.10 Removal

- A. After final vegetation is established, remove bales, silt fences, *ditch checks*, *diversions*, and other erosion control facilities. Restore areas disturbed by the removals.

3.11 Monitoring for WPDES Permit

- A. Unless indicated otherwise within the Contract Documents, the Contractor shall be responsible for the monitoring requirements of the WPDES permit for storm water discharges associated with construction activities.
- B. Erosion and sediment controls shall be routinely inspected at least every seven days, and within 24 hours after a precipitation event of 0.5 inches or greater. Weekly written reports of all inspections shall be maintained and submitted to the Engineer. The reports shall contain the following information:
 - 1. Date, time, and exact place of inspection.
 - 2. Name(s) of individual(s) performing inspection.
 - 3. An assessment of the condition of erosion and sediment controls.
 - 4. A description of any erosion and sediment control implementation and maintenance performed.
 - 5. A description of the sites present phase of construction.
- C. The Engineer will provide the Contractor with the appropriate DNR form (see section 00 62 30) to use for the inspections.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT, DISPOSAL & RECYCLING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Waste Management Goals
2. Waste Management Plan
3. Reuse
4. Recycling
5. Materials Sorting and Storage On Site
6. Lists of Recycling Facilities Processors and Haulers
7. Waste Management Plan Form

B. Related Sections:

1. Section 01 00 00 - Basic Requirements

1.2 WASTE MANAGEMENT GOALS

- A. Dane County requires that as many waste materials as possible produced as result of this project be salvaged, reused or recycled in order to minimize impact of construction waste on landfills and to minimize expenditure of energy and cost in fabricating new materials. Additional information may be found in The Dane County Green Building Policy, Resolution 299, 1999-2000.
- B. Contractor shall develop, with assistance of Public Works Project Manager and Architect / Engineer, Waste Management Plan (WMP) for this project. Outlined in RECYCLING section of this specification are examples of materials that can be recycled or reused as well as recommendations for waste sorting methods.

1.3 WASTE MANAGEMENT PLAN

- A. Contractor shall complete WMP and include cost of recycling / reuse in Bid. WMP will be submitted to Public Works Project Manager within fifteen (15) days of Notice to Proceed date. Copy of blank WMP form is in this Section. Submittal shall include cover letter and WMP form with:
1. Information on:
 - a. Types of waste materials produced as result of work performed on site;
 - b. Estimated quantities of waste produced;
 - c. Identification of materials with potential to be recycled or reused;
 - d. How materials will be recycled or reused;
 - e. On-site storage and separation requirements (on site containers);
 - f. Transportation methods; and
 - g. Destinations.

1.4 REUSE

- A. Contractors and subcontractors are encouraged to reuse as many waste materials as possible. Salvage should be investigated for materials not reusable on site.

1.5 RECYCLING

- A. These materials can be recycled in Dane County area:
 1. Wood.
 2. Wood Pallets.
 3. Fluorescent Lamps.
 4. Foam Insulation & Packaging (extruded and expanded).
 5. PVC Plastic (pipe, siding, etc.).
 6. Asphalt & Concrete.
 7. Bricks & Masonry
 8. Corrugated Cardboard.
 9. Metal.
 10. Carpet Padding.
 11. Gypsum Drywall.
 12. Shingles.
 13. Barrels & Drums.
 14. Solvents.

1.6 MATERIALS SORTING AND STORAGE ON SITE

- A. Contractor shall provide separate containers for recyclable materials. Number of containers will be dependent upon project and site conditions.
- B. Contractor shall provide on-site locations for subcontractors supplied recycling containers to help facilitate recycling.

1.7 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

- A. Web site www.countyofdane.com/pwht/recycle/categories.aspx lists current information for Dane County Recycling Markets. Contractors can also contact Dane County's Special Projects & Materials Manager at 608/266-4990, or local city, village, town recycling staff listed at site www.countyofdane.com/pwht/recycle/contacts.aspx. Statewide listings of recycling / reuse markets are available from UW Extension at www4.uwm.edu/shwec/wrmd/search.cfm.

1.8 WASTE MANAGEMENT PLAN FORM

A. Contractor Information:

Name: _____

Address: _____

Phone No.: _____ Recycling Coordinator: _____

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)	RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & reused building materials	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Glass	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood Pallets	_____ units	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Fluorescent Lamps	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Foam Insulation	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Asphalt & Concrete	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Bricks & Masonry	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
PVC Plastic	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Corrugated Cardboard	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Metals	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Carpet Padding	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Gypsum / Drywall	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____

Shingles	_____ cu. yds. _____ tons	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Barrels & Drums	_____ units	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Solvents	_____ gallons	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Building slabs-on-grade.
 - 2. Footings and foundations.
 - 3. Miscellaneous applications.
 - 4. Removal of existing foundation at existing doors.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.3 SUBMITTALS

- A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete,"
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82,
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.

2.5 COLORED CONCRETE – ALTERNATE BID (SEALED CONCRETE IS BASE BID)

- A. Basis-of-Design Product: Butterfield Uni-Mix System.
- B. Add integral color pigment to concrete mixture according to manufacturer's written instructions.
- C. Color: Butterfield integral concrete colorant U34 – Brick Red. Verify selection with Owner.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

2.7 VAPOR BARRIERS

- A. Vapor Barrier: ASTM #1745, Class A. Include manufacturer's recommended adhesive or pressure tape.
- B. Fine-Graded Granular Material Under Vapor Barrier: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.
- C. Technical Requirements:
 - 1. Puncture Resistance: 2200 grams.
 - 2. Tensile Strength: 76 lbf/in.
 - 3. Water Vapor Permeance: 0.0018 perms.
 - 4. Chemical Resistance: Unaffected.
 - 5. Life Expectancy: Indefinite.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Kure 200.
 - b. Conspec by Dayton Superior; W.B. Resin Cure.

- c. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
- d. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
- e. L&M Construction Chemicals, Inc.; L&M Cure R.
- f. Meadows, W. R., Inc.; 1100-CLEAR.
- g. Symons by Dayton Superior; Resi-Chem Clear.
- h. TK Products, Division of Sierra Corporation; TK-2519 DC WB.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 15 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.

2.11 CONCRETE MIX DESIGN SCHEDULE

- A. Concrete Mix Design Table

Type of Construction	28 Day Strength (psi)	Slump (Inches)	Maximum Aggregate Size (Inch)	Air Content ($\pm 1.5\%$)	Maximum Water/Cement Ratio
Footings	3000	4	1-1/2	2%	0.59
Grade beams, foundation walls	4000	4	1-1/2	4%	0.59
Columns	4000	4	3/4	5%	0.48
Interior Slab-on-Grade	3500	3	See Note 1	0%	0.50

Interior Topping Over Steel Deck, Precast & Safed Slabs	4000	3	See Note 1	0%	0.40
Suspended Slabs & Beams (Cast-in-Place)	4000	3	1	0%	0.50
Miscellaneous Concrete	4000	4	3/4	4%	0.48
Flowable Fill & Mud Slabs	75	--	1/2	0%	--

1. The maximum aggregate size for topping slabs shall be 3/4-inch for up to and including 2-1/2 inch topping slabs; 1-inch for between 2-1/2 and 3-1/2 inch topping, and 1-inch for 4-inch and thicker topping or slabs. For slabs on metal deck, topping thickness is concrete thickness above the deck.
2. The water-cement ratio specified in the above table shall be calculated using the weight of cement plus the weight of fly ash, slag, and silica fume.
3. Compressive strength in psi after 28 days when tested in accordance with ASTM C39. Compressive strength for 4000-psi slabs and interior topping is after 56 days.
4. Aggregate is listed as maximum size in inches. Aggregate shall be in saturated surface dry (SSD) condition.
5. Weight is listed as pounds per cubic foot, air dry. Unless noted otherwise concrete shall be 145-pcf plus or minus 5-pcf.
6. Slump:
 - a. In inches when tested in accordance with ASTM C143, prior to the addition of plasticizers.
 - b. Maximum slump cannot vary in field by more than plus or minus one (1)-inch.
7. Air content shall be measured at truck discharge.
8. Mix shall be designed, tested and adjusted if necessary, and approved in ample time before first concrete is scheduled to be placed.
9. If mix yield exceeds one-cubic yard, modify mix design to no more than one-cubic yard without changing cement content.
10. The Subcontractor's mix designs shall be subject to review by the Architect and by the Independent Testing Agency.
11. High-range water-reducing admixtures shall be added at job site.

12. All batch water shall be added at the plant.
13. Introduction of calcium chloride is not permitted.
14. Unspecified admixtures shall not be permitted without approval by the Project Architect. After approval is obtained, Subcontractor shall modify mix designs and said modifications shall be accepted by the Independent Testing Agency before use.
15. Lightweight concrete proportions shall be selected to meet the specified limit on a maximum air-dry unit weight as measured in accordance with ASTM C567.
16. For exterior topping over precast exposed to de-icing chemicals, maximum amount of silica fume is 10 percent of cementitious material. Maximum amount of fly ash, granulated blast furnace slag and silica fume is 50 percent of total cementitious material.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days unless specified differently by precast supplier.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size at sidewalks, curbs, etc.
5. Air Content: Do not allow air content of troweled finished floors to exceed 1 percent.

B. Concrete Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
3. Steel-Fiber Reinforcement: Add to concrete mixture according to manufacturer's written instructions.

2.13 IN-FLOOR RADIANT HEAT TUBES

- ### A. Apply concrete in minimum uniform thickness of 2 inches as required to accommodate camber, deflection, and in-floor heat tubing coverage.

2.14 FABRICATING REINFORCEMENT

- ### A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

- ### A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING FOUNDATION

- A. Saw cut existing foundation at existing doors and regrade dirt floor to accommodate new concrete slab.

3.2 FORMWORK

- A. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- B. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class B, 1/4 inch for rough-formed finished surfaces.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.3 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install dovetail anchor slots in concrete structures as indicated.

3.4 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 VAPOR BARRIERS

- A. Vapor Barriers: Refer to Division 7 Section "Building Insulation" for installation of taped rigid insulation.
- B. Granular Course: Cover below-slab insulation with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls at 30' – 0" O.C. max. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Control Joints:
 - 1. For slab-on-grade, divide into as nearly square as possible panels with a length to width ratio not to exceed 1.5. Joints shall be spaced 15 plus or minus 5-feet apart and on column centerlines where possible. Joint indentation width shall be a maximum 3/16-inch with a depth of one-fourth the slab thickness. Refer to the Drawings for additional information on control joints.
 - 2. For topping slabs on metal deck, wood deck or precast, joints shall be spaced 30 plus or minus 5-feet apart and on column centerlines where possible. Joint indentation width shall be a maximum 3/16-inch with a depth of 1/2-inch. Refer to Drawings for additional information on control joints.
 - 3. Joint indentation to be formed by insertion of strip joint material before concrete sets, grooving during finishing or saw cut when concrete is set hard enough not to produce a torn joint edge, but within 12 hours after placement.
 - 4. Interior joints to be sealed with elastomeric sealant and placed in accordance with manufacturer's recommendations, when required.

- E. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.
- C. Slab Scoring and Finishing: Scoring pattern as shown on Drawings. All interior exposed floor slabs to have hard trowel finish.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. 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.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 5. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. , but less than 25 cu. yd. , plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. 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 shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. Slump: ASTM C 143/C 143M; 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.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 6. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
- a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every 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.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall 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.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall 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 Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION

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SECTION 03 31 01
SITWORK CONCRETE

PART 1 - GENERAL

1.01 Section Includes

- A. Cast-in-place concrete for curb and gutter, sidewalk, exterior slabs, and other similar exterior concrete. Does not include concrete pavement.

1.02 Related Sections

- A. Section 01 45 16 – Testing Requirements.

1.03 References

- A. ACI 301 - Specifications for Structural Concrete.
- B. ACI 305R - Hot Weather Concreting.
- C. ACI 306R - Cold Weather Concreting.
- D. ACI 308 - Standard Practice for Curing Concrete.
- E. ASTM A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- F. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- G. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
- H. ASTM C33 - Standard Specification for Concrete Aggregates.
- I. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- J. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- K. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- L. ASTM C150 - Standard Specifications for Portland Cement.
- M. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
- N. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete.
- O. ASTM C260 - Air Entraining Admixtures for Concrete.
- P. ASTM C494 - Chemical Admixtures for Concrete.
- Q. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- R. ASTM C618 - Coal Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement.
- S. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds having Special Properties for Curing and Sealing.
- T. ASTM D1751 - Performed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- U. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.04 Quality Assurance

- A. Perform concrete work in accordance with ACI 301.
- B. Conform to ACI 305R when concreting in hot weather and ACI 306R when concreting in cold weather.

1.05 Submittals

- A. Concrete Mix Design
 - 1. Provide dry weight of cement, saturated-surface dry weight of aggregate, brand name, type, and quantity of admixtures, and pounds of water per cubic yard of concrete.
 - 2. Test data supporting the portions of the design mixes based on laboratory trial batches in accordance with ACI 318. Test data supporting the proportions of the design mixes based on past field experience in accordance with ACI 318 may be provided in lieu of the laboratory data.
- B. Admixtures: Submit manufacturer's literature and certifications.
- C. Delivery Tickets: Provide for each load of concrete delivered; include the following information: Name of ready-mix batch plant, serial number of ticket, date, truck number, name of contractor, name and location of job, class of concrete, amount of concrete in cubic yards, time loaded or of first mixing of cement and aggregate, water added at jobsite and initials of person authorizing addition, admixtures, if added.
- D. Test Results.

PART 2 - PRODUCTS

2.01 Reinforcement

- A. Reinforcing Steel: ASTM A615; Grade 60, deformed, unfinished.
- B. Welded Steel Wire Fabric: ASTM A185: flat sheets, unfinished.

2.02 Concrete Materials

- A. Portland Cement: ASTM C150, Type 1.
- B. Aggregate: ASTM C33.
- C. Water: Clean and not detrimental to concrete.
- D. Flyash: ASTM C618, Class C.

2.03 Concrete Admixtures

- A. Air Entrainment: ASTM C260.
- B. Water Reducing: ASTM C494; Type A, Water Reducing.
- C. Retarding: ASTM C494. Type D, Water Reducing and Retarding.
- D. Accelerating: ASTM C494 Type C Accelerating (non-chloride); Type E, Water Reducing and Accelerating (non-chloride).

2.04 Accessories

- A. Curing Material: Liquid membrane curing compound; ASTM C309, Type 2, white pigmented.
- B. Curing/Sealing Material:
 - 1. An acrylic resin curing, sealing, and hardening compound for exterior freshly placed concrete that provides a durable, long-lasting moisture impermeable finish that improves resistance to chemicals, grease, and de-icing salts.
 - 2. Meet requirements of ASTM C1315, Type 1, Class B and ASTM C309, Type 1, Classes A

- and B.
- 3. Manufacturer: AS-1 Achro Seal 1315 OTC, TK Products; Seal Cure 309-30, W.R. Meadows; or equal.
- C. Expansion Joint Fillers: ASTM D1751 or ASTM D1752.

2.05 Concrete Mix Design

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Select proportions in accordance with ACI 301.
- C. Provide concrete in accordance with the following requirements:
 - a. Concrete Mixes

Concrete Mixes		
Class	Compressive Strength at 28 days, psi	Max. Water-Cement Ratio By Weight
Air-Entrained Concrete		
D	4,000	0.48

- 2. Air Content: Total air content (entrained and entrapped) for air-entrained concrete shall be in accordance with the following table:

Air Content	
Nominal Max. Size Aggregate	Air Content
3/4"	6% ± 1
1"	6% ± 1
1 1/2"	5% ± 1

- 3. In any mix, up to 20 percent of the cement (on a pound per pound basis) may be replaced with flyash.
- D. Slump: 3 inches plus or minus 1 inch.

PART 3 - EXECUTION

3.01 Preparation for Concrete Placement

- A. Check grades and placement of forms.
- B. Remove debris, water, excess form oil etc. from forms.
- C. Verify that anchors, seats, plates, reinforcement, inlet castings, and other items to be cast into concrete are accurately placed, and anchored securely.
- D. Provide a minimum cover of 1-1/2 inch for reinforcing bars.
- E. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
- F. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert dowels and pack solid with non-shrink grout.

3.02 Delivery

- A. Deliver and discharge concrete within 90 minutes or before 300 drum revolutions, whichever comes first, after the addition of water to the cement.
- B. Do not add water to the mix after the initial introduction of water without the approval of the Engineer. If water is added at the jobsite, the concrete shall be mixed a minimum of 30 drum revolutions. Any water added shall not bring the total water in the mix to an amount above the specified water-cement ratio.
- C. The temperature of the concrete as delivered shall not exceed a temperature of 90°F.

- D. When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40°F for more than three successive days, concrete shall be delivered to meet the following temperature immediately after placement:

Minimum Concrete Temperature	
Section Size	Min. Temperature
<12"	55°F
12"-36"	50°F
36"-72"	45°F
>72"	40°F

3.03 Placing Concrete

- A. Place concrete in accordance with ACI 318.
- B. Notify Engineer a minimum of 24 hours prior to concrete placement.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion joints and contraction joints are not disturbed during concrete placement.
- D. Deposit concrete as close as practical to its final position. Do not drop concrete more than five feet vertically.
- E. Place concrete continuously between predetermined construction joints.
- F. Do not interrupt the placement. Do not permit cold joints.
- G. Thoroughly consolidate concrete by suitable means during placement. Thoroughly work concrete around reinforcement and embedded items and into corners of forms.

3.04 Joints

- A. Construction Joints: Joints that are placed at the end of a days work. In slabs they may be placed to permit movement and/or to transfer load.
- B. Expansion Joints: Joints that separate or isolate slabs from other parts of the structure such as walls, footings, columns, and equipment bases and drives and sidewalks from stairs, walls, light poles and other obstructions. Separate slabs on grade from vertical concrete surface with 1/2- inch preformed joint filler. Filler shall extend the full depth of the concrete with the top slightly lower than the concrete surface.
- C. Control Joints: Joints in slabs to create planes of weakness so that cracks will occur at desired locations.
 1. Provide joints to form panels or patterns as indicated on the Drawings. If joints are not shown, consult Engineer for joint placement.
 2. Inserts: Form 1/4 inch wide joints, one-fourth the depth of the slab thickness (one inch minimum) by inserting pre-molded hardboard or fiberboard strips into the fresh concrete. The top surface of the strip shall be flush with the slab surface. After concrete has cured for a minimum of seven days remove inserts and clean loose debris from the joints.
 3. Sawed Joints (Normal): Saw joints as soon after concrete is set sufficiently to preclude raveling during sawing and before shrinkage cracking takes place. Saw joints no later than 24 hours after concrete placement. Joints shall be 1/8 inch wide and one-fourth the slab thickness (one inch minimum).
 4. Sawed Joints (Early Entry): Saw joints using the "SOFF-CUT System" or equal. Cut as soon as the slab will support the weight of the saw and the operator (normally within two hours). Joints shall be 1/8 inch wide and ten percent of the slab thickness (depth shall be at least equal to the largest aggregate size).

3.05 Concrete Finishing

- A. Provide finish in accordance with ACI 301, Section 5.
- B. Unless indicated otherwise, provide a broom finish for concrete for curb and gutter, sidewalk, and exterior slabs. Immediately after the concrete has been floated, give the surface a course scored

texture using a broom.

3.06 Curing and Protection

- A. General:
 - 1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 3. Cover concrete with polyethylene if rain is eminent.
 - 4. Cure concrete in accordance with ACI 308.
- B. Liquid Membrane-Forming Curing Compound (Curb and Gutter):
 - 1. Apply after finishing as soon as the free water on the surface has disappeared and no water sheen is visible, but not so late that the curing compound will be absorbed into the concrete.
 - 2. Apply at a uniform rate of 200 sq. ft. per gallon. When feasible, apply in two applications at right angles to each other with the second coat being applied within 30 minutes of the first.
 - 3. Coat edges within 30 minutes of form removal.
- C. Curing/Sealing Compound (Sidewalk):
 - 1. Cure and seal concrete with a uniform coating of membrane curing/sealing compound.
 - 2. Apply with sprayer in accordance with the manufacturer's printed instructions.
 - 3. Apply two coats at right angles to each other.
 - 4. Do not apply if the temperature of the concrete is less than 40°F.
 - 5. Protect concrete from all traffic for three days and from vehicular traffic for seven days.

3.07 Field Quality Control

- A. Sampling and testing shall be the responsibility of the Contractor. See Section 01 45 16 Testing Requirements.
- B. Provide free access to Work and cooperate with testing personnel.
- C. Four concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed in one day. Test cylinders will be lab cured. One test cylinder will be broken at 7 days, two at 28 days and one will be held.
- D. Engineer may require the casting additional test cylinders for field curing when cold or hot weather may affect curing.
- E. One slump test, one air test and the concrete temperature will be taken for each set of test cylinders.
- F. Sampling and testing will be performed in accordance with the following:
 - 1. Concrete samples: ASTM C172.
 - 2. Test cylinders: ASTM C31.
 - 3. Slump tests: ASTM C143.
 - 4. Air test: ASTM C231.
- G. In addition to providing test results to the Engineer, provide the test results to the concrete supplier.

3.08 Patching

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Honeycomb, embedded debris, and tie holes are not acceptable.
- C. Patch imperfections in accordance with ACI 301, Section 5.

3.09 Defective Concrete

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Engineer.

END OF SECTION

SECTION 04 23 00

GLASS UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass block set in silicone sealant.

B. Related Sections Include:

1. Division 6, Section "Interior Architectural Woodwork" for wood trim.

1.2 SUBMITTALS

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

B. Samples: Glass-block units.

PART 2 - PRODUCTS

2.1 GLASS BLOCK

A. Hollow Glass Block: Hollow units made from transparent glass, with manufacturer's standard edge coating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Mulia Inc. (Distributed by Glass Blocks Unlimited and Mulia, Inc.).
- b. Nippon Electric Glass Co., Ltd. (Distributed by Glass Blocks Unlimited and Nippon Electric Glass America, Inc.).
- c. Oberland Glas AG, Bauglas Div.; Solaris Glasstein (Distributed by Glass Blocks Unlimited and North America Glass).
- d. Pittsburgh Corning Corporation.
- e. Seves (Distributed by Glass Blocks Unlimited, International Product Supply, and Seves North America).
- f. J. Weck GmbH (Distributed by Glashaus, Inc. and Glass Blocks Unlimited).
Approved Equal.

2. Glass Color: Colorless.

3. Pattern: Wavy, allowing light but providing visual privacy.

4. Edge-Coating Color: As selected from manufacturer's full range.
5. Sizes: Manufacturer's standard sizes.

2.2 GLASS UNIT MASONRY ACCESSORIES

- A. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded; complying with ASTM A 951 in straight lengths of not less than 10 feet, and as follows:
 1. Interior Walls: Hot-dip galvanized, carbon-steel wire.
 2. Wire Size: W1.7 or 0.148-inch diameter.
 3. Spacing of Cross Rods: Not more than 16 inches apart.
- B. Panel Anchors: Glass-block manufacturer's standard perforated steel strips, 0.0359 inch by 1-3/4 inches wide by 24 inches long, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
- C. Mortarless Installation System: System of aluminum or plastic perimeter framing, anchors, and spacers designed for installing glass block with sealant-filled joints.
- D. Fasteners, General: Unless otherwise indicated, provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at interior walls. Select fasteners for type, grade, and class required.
- E. Sealants: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below.
 1. Single-component, nonsag urethane sealant.

PART 3 - EXECUTION

3.1 INSTALLING GLASS BLOCK WITH SEALANT

- A. General: Install mortarless glass-block according to manufacturer's written instructions.
- B. After glass block is installed, apply sealant to completely fill channel around each glass block, and tool flush with exterior surface. Remove excess sealant and smears.

3.2 CLEANING

- A. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY & SUBFLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Wood furring.
3. Plywood backing panels.
4. Blocking.
5. Subflooring.
6. Wood ceiling and soffit.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, unless otherwise indicated.
3. Framing Order Waste Factor Limit: Limit the overall estimates waste factor to 10% or less. Waste factor is defined as the percentage of framing material ordered in excess of the estimated material needed for construction.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC 4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction, Use Category UC3b for exterior construction.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings. Treat rough carpentry items indicated on Drawings, and the following:
1. Framing for raised platforms.
 2. Framing for stages.
 3. Concealed blocking.
 4. Framing for non-load-bearing partitions.
 5. Framing for non-load-bearing exterior walls.
 6. Roof construction.
 7. Plywood backing panels.

2.5 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
- C. Framing Other Than Non-Load-Bearing Interior Partitions: Construction or No. 2.
1. Species and grade to match existing timber column.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Furring.
 4. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NeLMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.7 SUBFLOORING

- A. Plywood Subflooring: 3/4-inch APA rated tongue and groove.

2.8 CEILING

- A. APA rated tongue and groove to match plank subfloor above. See Drawings for location.

2.9 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated where indicated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.10 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified.
 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.11 METAL FRAMING ANCHORS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by :
 1. Simpson Strong-Tie Co., Inc.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.12 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.
- E. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

END OF SECTION

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SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior wood baseboards.
 - 2. Wood shelf.
 - 3. Wood trim (for doors and glass block window).
- B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

- A. Product Data: For each type of product, including finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.

1.3 QUALITY ASSURANCE

- A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."
 - 1. Custom grade, unless indicated otherwise.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.5 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Coordinate work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Unless otherwise indicated, comply with the “Architectural Woodwork Standards” for grades of wood indicated for construction, finishes, installation, and other requirements.
- B. Wood Species and Cut for Transparent Finish: Birch.
- C. Wood Products to Comply with the Following:
 - 1. Hardboard: AHA A135.4.
 - 2. Particleboard: ANSI A208.1, Grade M-2, made without urea formaldehyde.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1 made without urea formaldehyde.
- D. Wood Materials:
 - 1. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood and quality grade specified, unless otherwise indicated.
 - a. Wood Moisture Content for Interior Materials: 5 to 10 percent.
- E. Wood Trim: Hardwood lumber; FS MM-L-736; premium grade in accordance with AWI; maximum moisture content of 6 percent; birch, of quality capable of transparent finish.

2.2 ACCESSORIES

- A. Wood Filler: Oil base, tinted to match surface color.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
- C. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.

D. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.4 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

B. Wood Shelf:

1. Wood shelf at top of lower Dutch door panel to match wood face veneer of door.

C. Wood Trim:

1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
2. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
3. Assemble casings in plant except where limitations of access to place of installation require field assembly.
4. Door Trim: 3/4" x 4"; birch, stained.
5. Window Trim: 3/4" x 4"; birch, stained.

D. Wood Baseboards:

1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
2. Back out or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
3. Assemble casings in plant except where limitations of access to place of installation require field assembly.
4. Wood: Birch with clear finish.
5. Height: 6 inches.
6. Thickness: 3/4".

2.5 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.

C. Transparent Finish:

1. Grade: Premium.
2. AWI Finish System: Waterborne clear acrylic. Two finish coats of waterborne clear acrylic varnish over a sealer coat and interior wood stain. Wipe wood filler before apply stain.
 - a. Filler Coat: Open-grain wood filler.
 - b. Stain Coat: Interior wood stain (semitransparent).
 - c. Color: See Room Finish Schedule. Verify selection with Owner.

- d. Sealer Coat: Clear sanding sealer.
- e. Finish Coats: Interior polyurethane-based clear satin finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

3.2 PREPARATION

- A. Provide anchoring devices for installation and embedding.
- B. Provide templates and rough-in measurements.

3.3 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and back-priming.
- B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Wood Baseboards: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
- G. Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base.
- H. All finishes must be smooth, uniform in color and match approved samples.
- I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- J. Prior to final inspection, examine installation of the Work of this Section. Repair or replace all defects found. Leave installation clean and undamaged.

3.4 REPAIRING, ADJUSTING, AND CLEANING

- A. Replace damaged and defective work.
- B. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.
- D. Clean according to manufacturer's directions. Use no acids or harsh abrasives.
- E. Leave surfaces clean and without defects.

END OF SECTION

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SECTION 06 64 00

PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) paneling and trim accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Materials are to be factory packaged on strong pallets.
- B. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels in a dry indoor location. Remove any foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace FRP panels that fail in materials or workmanship within specified warranty period.
 - 1. Failures shall include, but not be limited to, substantial defects in material and workmanship, rotting, rusting, corrosion, development of structural surface cracks, or requiring painting or refinishing.
 - 2. Warranty Period: 2 years from date of Substantial Completion.
- B. Installer's Warranty: Installer's standard form in which installer agrees to repair or replace FRP panels that fail due to poor workmanship or faulty installation within specified warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Marlite.
 - b. Crane Composites, Inc.
 - c. Nudo Products, Inc.
 - d. Approved Equal.
 2. Nominal Thickness: Not less than 0.075 inch plastic surface factory laminated on 5/8" gypsum board substrate.
 3. Surface Finish: Smooth.
 4. Color: See Room Finish Schedule. Verify selection with Owner.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 1. Color: See Room Finish Schedule. Verify selection with Owner.
- B. Adhesive: As recommended by plastic paneling manufacturer for the required substrates with a VOC content of 50 g/L or less.
- C. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer. Sealant shall have a VOC content of 250 g/L or less.
- D. Mechanical Fasteners: Countersunk screws with fastener caps.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space no less than 24 hours before installation. Follow manufacturer's written recommendations if more condition time is required.

- C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches wide.

3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive with mechanical fasteners.
- C. Install trim accessories with adhesive and nails. Do not fasten through panels.
- D. Sealant:
 - 1. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
 - 2. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths.
- E. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- F. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

3.3 CLEANING AND PROTECTION

- A. Remove temporary coverings and protection of adjacent work areas.
- B. Repair or replace any installed products that have been damaged.
- C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.
- D. Remove and lawfully dispose of construction debris away from Project site.
- E. Protect installed product and finish surfaces from damage during remainder of construction.

END OF SECTION

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SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Sound attenuation insulation.
4. Vapor barriers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product test reports.
- C. Research/Evaluation Reports: For foam-plastic insulation.

1.3 QUALITY ASSURANCE

- A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
- B. Recycled Content: Provide glass-fiber insulation with recycled content so postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV , 1.60 lb/cu. ft., with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
1. Manufacturers:
 - a. DiversiFoam Products.
 - b. Amofoam.
 - c. Dow Chemical Company.
 - d. Owens Corning.
 - e. U.C. Industries.
 - f. Minnesota Diversified.
- B. Unfaced Extruded Board Insulation: ASTM C518 and ASTM C 578, water absorption in accordance with ASTM C 272, 0% by volume maximum.
1. Manufacturers:
 - a. DiversiFoam Products.
 - b. Amofoam.
 - c. Dow Chemical Company.
 - d. Owens Corning.
 - e. U.C. Industries.
 - f. Minnesota Diversified.
- C. Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1 or 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on test performed on unfaced core on thicknesses up to 4 inches.
1. Compressive Strength: 25 psi minimum at second floor.
 2. Manufacturers:
 - a. Atlas Roofing Corporation.
 - b. Dow Chemical Corporation.
 - c. Rmax, Inc.
 - d. Approved Equal.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
1. CertainTeed Corporation.
 2. Johns Manville.
 3. Owens Corning.
- B. Unfaced, Glass-Fiber Batt Insulation: ASTM C665, Type I (blankets without membrane facing): consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- C. Unfaced, Glass-Fiber Sound Attenuation Batt Insulation: ASTM C 665, Type 1, with maximum flame spread and smoke developed indexes of 10, when tested in accordance with ASTM E 84, passing ASTM E 136.

- D. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III, Class B; consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.4 VAPOR BARRIERS

- A. Polyethylene Vapor Barriers: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.10 perm.

2.5 AUXILIARY INSULATING MATERIALS

- A. Vapor-Barrier Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
- B. Vapor-Barrier Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- C. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- D. Adhesive for Vapor Barriers: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor barriers securely to substrates indicated.
- E. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- F. Impaling pins: Impaling pins shall be self-adhering wire pins with sheet metal retaining clips and protective rubber tips. Adhesive for pins shall be as recommended by the pin manufacturer.
- G. Joint Tape: Compatible for type of insulation board facing used.
- H. Acoustical Sealant: Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting copper-coated steel spindle 0.105 inch in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch square or diameter self-locking washers complying with the following requirements:
 - 1. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel sheet, with beveled edge for increased stiffness.
 - 2. Where anchors are located in attic spaces Insert location, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.
- B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF PERIMETER AND SLAB EDGE INSULATION

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
- B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.
- C. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-barrier-faced units with vapor barrier to warm-in-winter side of construction, unless otherwise indicated.
 - 1. Tape joints and ruptures in vapor barrier, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

- D. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor barrier once finish material is installed over it.
- E. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.4 INSTALLATION OF INSULATION FOR SOUND ATTENUATION

- A. Install unfaced glass-fiber blanket insulation as shown on Drawings.

3.5 INSTALLATION OF VAPOR BARRIERS

- A. General: Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor barrier to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor barriers over framing by lapping not less than two wall studs. Fasten vapor barriers to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

- C. Before installing vapor barrier, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor barriers with vapor-barrier tape according to vapor-barrier manufacturer's written instructions. Seal butt joints with vapor-barrier tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor barriers to metal framing and solid substrates with vapor-barrier fasteners as recommended by vapor-barrier manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barriers with vapor-barrier tape to create an airtight seal between penetrating objects and vapor barrier.
- F. Repair tears or punctures in vapor barriers immediately before concealment by other work. Cover with vapor-barrier tape or another layer of vapor barrier.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Standard hollow metal doors and frames.

B. Related Sections include the following:

1. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame and window frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of hollow metal doors and frames using the same reference numbers for details and openings as those on Drawings:

1. Elevations of each door and window design.
2. Details of doors and windows, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Details of conduit and preparations for electrified door hardware and controls.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer.

- C. Fire-Rated Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
- D. Smoke-Control Door Assemblies: Provide an assembly with gaskets listed and labeled for smoke control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784, and installed in compliance with NFPA 105.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.
 - 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating hollow metal frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steelcraft.
 - 2. Curries Company.
 - 3. Firedoor Corporation.

4. Mesker Door.
5. Security Metal Products.
6. Approved equal.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
- G. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- H. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal door frames of type indicated.
- I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- J. Grout: ASTM C476, except with a maximum slump of four (4) inches, as measured according to ASTM C 143/C 143 M.
- K. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other impurities.

2.3 HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with SDI A250.8.
- B. Design: As indicated on Drawings.

1. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces door complying with A250.8.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.17 when tested according to ASTM C 1363.
 - 1) Locations: As noted on drawings.
 2. Vertical Edges for Single-Acting Doors: Beveled edge unless square edge is indicated.
 - a. Beveled edge: 1/8 inch in 2 inches.
 3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
 4. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level:
1. Level 2 and Physical Performance Level C (Standard Duty), Model 1 (Full Flush).
 2. Width: As indicated on Drawings.
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 3. Lock Face Closers, and Concealed Holders: Minimum 0.067 inch thick.
 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet unless otherwise indicated to comply with exterior frame requirements.
 1. Fabricate interior frames with mitered or coped corners, welded or knocked down for field assembly as indicated on drawings.
 2. Steel Sheet Thickness for Interior Doors: 0.053-inch-thick, unless otherwise indicated.

3. Knockdown frames may be used on interior doors, excluding basement level and stair doors, provided that the metal gage meets or exceeds the above specifications and the required fire ratings are met.
- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 3. Lock Face Closers, and Concealed Holders: Minimum 0.067 inch thick.
 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042-inch thick.
 2. Compression Type for Drywall Slip-on-Frames: Adjustable compression anchors.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042-inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors with two holes to receive fasteners.
 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

2.6 STOPS AND MOLDINGS

- A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- B. Terminated Stops: Where indicated, terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016-inch-thick.

2.8 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.9 FABRICATION

- A. General: Fabricate standard hollow metal doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SD 117.
- C. Hollow Metal Doors:
 - 1. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- D. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 4. Grout Guards: Provide where mortar might obstruct hardware operation.
 - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Four anchors per jamb from 60 to 90 inches high.
 - 2) Five anchors per jamb from 90 to 96 inches high.

- 3) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 4) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware include cutouts, reinforcement, mortising, drilling and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 1. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
 2. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware.
 3. Locate hardware as indicated, or if not indicated, according to ANSI/SDA A250.8.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 1. Provide fixed frame moldings on secure side of interior doors and frames.
 2. Provide loose stops and moldings on inside of hollow metal work.

2.10 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 1. Finish hollow metal doors and frames after assembly.
- B. Factory Finish: All hollow metal doors and frames to be factory finished.
 1. Finish to be selected by Owner from manufacturer's standard range.

2.11 ACCESSORIES

- A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of hollow metal doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of hollow metal frame connections before frame installation.
 - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install hollow metal doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install standard hollow metal frames for doors and other openings, of size and profiles indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.

- b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Apply bituminous coating to backs of frames that are filled with mortar, grout and plaster containing anti-freezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
- a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 5 Section "Unit Masonry Assemblies."
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Hollow Metal Doors:

- a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core flush wood doors with wood veneer.
 - 2. Factory finishing flush wood doors.
 - 3. Factory machining for hardware.
- B. Related Sections include the following:
 - 1. Division 8 Section "Door Hardware" for door hardware for wood doors.

1.2 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data, and the following:
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Requirements for veneer matching at doors with hardwood veneer.
 - 4. Doors to be factory finished and finish requirements.
 - 5. Fire-protection ratings for fire-rated doors.
- C. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide three samples showing typical range of color and grain to be expected in the finished work.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Jeld-Wen Windows and Doors.
 - 2. Kolbe Windows and Doors.
 - 3. Algoma Hardwoods Inc.
 - 4. Mohawk Flush Doors, Inc.
 - 5. Approved Equal.

2.2 DOOR CONSTRUCTION, GENERAL

- A. For Transparent Finish - Hardwood Veneer: AWI custom quality wood, plain sliced with book matched hardwood veneer for transparent finish:
 - 1. Wood: Birch.
- B. Interior Solid-Core Doors:
 - 1. Grade: Custom.
 - 2. Faces: Any closed-grain hardwood of mill option.
 - 3. Core: Either glued wood stave or structural composite lumber.
 - 4. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

C. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Provide doors with sufficient undercut to allow clearance above finish floors

1. Where schedule floor finish material is less than 1/2" thick, allow not more than 5/8" above top of substrate to which it is applied.
2. Where schedule floor finish material is more than 1/2" thick, allow not more than 1/4" above finish material.
3. Allow not more than 1/4" above threshold where applicable.

2.4 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: Interior polyurethane-based clear satin varnish.

3. Staining: As selected by Architect from manufacturer's full range; VOC content not more than 250 g/L.
4. Effect: Semi-filled finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation see Division 08 "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
- C. Factory-Finished Doors and Frames: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes hardware for new and existing doors.
 - 1. On existing doors, remove knobs and replace with lever sets or panic hardware, as indicated.
 - 2. On existing doors, remove thresholds and replace with ADA compliant thresholds.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed finish.
- C. Other Action Submittals:
 - 1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating and material of each door and frame.
 - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
 - 3) Complete designations of every item required for each door or opening including name and manufacturer.
 - 2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
 - 1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.
- D. Hardware shall be in strict accord with the applicable provisions of the ADA-ABA Accessibility Guidelines; the International Building Code, Chapter 11 Accessibility; the Wisconsin Administrative Code, Chapter Comm 62, and local codes.
- E. Key Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
 - 1. Warranty Period: Three years from date of Substantial Completion, except as follows:
 - a. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in door and frame schedule.
- B. Designations: Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements.
 - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- C. Finishes:
 - 1. Brushed chrome (652/US26D)/ stainless steel.
 - 2. Closers: Brushed chrome (652/US26D)/stainless steel.
 - 3. Other Hardware: Matching finish of lockset/latchset.

4. Verify all hardware finishes with Owner prior to ordering.

2.2 HINGES, GENERAL

- A. Template requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Hinge Base Metal: Unless otherwise indicated, provide the following:
 1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 2. Interior Hinges: Steel, with steel pin.
 3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.
- C. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.
- D. Fasteners: Comply with the following:
 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 2. Wood Screws: For wood doors.
 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors, wood screws for wood doors. Finish screw heads to match surface of hinges.

2.3 HINGES

- A. Butts and Hinges: BHMA A156.1.
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Manufacturers:
 1. Hager Companies (HAG).
 2. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
 3. Or approved equal.
- D. Hinges:
 1. Spring loaded hinges to meet ANSI K81071F; two (2) minimum at Entry Doors only.
 2. Provide one (1) pair hinges on 1-3/4" H.C. doors and one and one-half (1-1/2) pair hinges on all other doors.
 3. Hinges to match lockset finish.
 4. Outswing doors shall have non-rising pins.
 5. Where hinges are required to swing 180 degrees, furnish hinges of sufficient throw to clear the trim.

2.4 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Lock Throw: Comply with testing requirements for length of bolts required for fire labeled fire doors.
- E. Backset: 2-3/4 inches unless otherwise indicated.
- F. Strikes: Manufacturer's standard strike with strike box for each latch bolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.
- G. **Lever sets throughout.**

2.5 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:
 - 1. Bored Locks: BHMA A156.2.
 - 2. Interconnected Locks: BHMA A156.12.
- B. Bored Locks: BHMA A156.2, Grade 1; Series 4000.
 - 1. Manufacturers: Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
 - 2. Approved Equal.

2.6 EXIT DEVICES

- A. Exit Devices: BHMA A156.3, Grade 1.
- B. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
- C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

- E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- F. Outside Trim: Lever with cylinder; material and finish to match locksets, unless otherwise indicated.
 - 1. Match design for locksets and latchsets, unless otherwise indicated.
- G. Through Bolts: For exit devices and trim fire-rated wood doors.
- H. Manufacturers:
 - 1. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
 - 2. Von Duprin; an Ingersoll-Rand Company (VON).
 - 3. Dor-O-Matic; an Ingersoll-Rand Company (DOR).
 - 4. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

2.8 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5, Grade 1.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of Pins: Six.

Permanent Cores: Manufacturer's standard; finish face to match lockset; with interchangeable cores.

- D. Construction Keying: Comply with the following:
 - 1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 4 construction master keys.
 - 2. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
 - a. Furnish permanent cores to Owner for installation.
- E. Manufacturer: Same manufacturer as for locks and latches.

2.9 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. System to be approved by Owner.

2.10 CLOSERS

- A. Accessibility Requirements: Comply with the following maximum opening-force requirements:
 - 1. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.

2. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
 - C. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.
 - D. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - E. Surface Closers: BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
 1. Manufacturers:
 - a. Arrow USA; an ASSA ABLOY Group company (ARW).
 - b. Norton Door Controls; an ASSA ABLOY Group company (NDC).
 - c. Or approved equal.

2.11 STOPS AND HOLDERS

- A. Stops and Bumpers: BHMA A156.16, Grade 1.
 1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
- B. Mechanical Door Holders: BHMA A156.16, Grade 1.
- C. Wall Stops and Holders: BHMA A156.8, Grade 1.
- D. Combination Floor and Wall Stops and Holders: BHMA A156.8, Grade 1.
- E. Combination Overhead Stops and Holders: BHMA A156.8, Grade 1.
- F. Silencers for Door Frames: BHMA A156.16, Grade 1; neoprene or rubber; fabricated for drilled-in application to frame.
- G. Manufacturers:
 1. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
 2. Hager Companies (HAG).
 3. IVES Hardware; an Ingersoll-Rand Company (IVS).
 4. Or approved equal.

2.12 DOOR GASKETING

- A. Standard: BHMA A156.22.
- B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.
 - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- C. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
- G. Manufacturers:
 - 1. Hager Companies (HAG).
 - 2. M-D Building Products, Inc. (MD).
 - 3. National Guard Products (NGP).
 - 4. Pemko Manufacturing Co. (PEM).
 - 5. Reese Enterprises (RE).
 - 6. Sealeze; a unit of Jason Incorporated (SEL).
 - 7. Zero International (ZRO).
 - 8. Or approved equal.

2.13 THRESHOLDS

- A. Standard: BHMA A156.21.
- B. Accessibility Requirements: Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
- C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.
- D. Location: At exterior doors.
 - 1. Types: Guide Specification – Hager (HAG).

a. Threshold: 410 S. Verify width required.

E. Manufacturers:

1. National Guard Products (NGP).
2. Pemko Manufacturing Co. (PEM).
3. Hager Companies (HAG).
4. Reese Enterprises (RE).
5. Zero International (ZRO).
6. Or approved equal.

2.14 MISCELLANEOUS DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16, Grade 1.

1. Manufacturers:

- a. Baldwin Hardware Corporation (BH).
- b. Cal-Royal Products, Inc. (CRP).
- c. Don-Jo Mfg., Inc. (DJO).
- d. Hager Companies (HAG).
- e. Lawrence Brothers, Inc. (LB).
- f. Rockwood Manufacturing Company (RM).
- g. Stanley Commercial Hardware (STH).
- h. Trimco (TBM).

C. Accessories

1. Furnish all necessary hardware accessories such as wood or machine screws, bolts, nuts, anchors, toggle bolts, and other fasteners, each of the type, size, material and finish for its intended purpose and each according to the material to which the hardware is being applied.
2. Keying system will be determined by Owner.

2.15 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

B. Fasteners: Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Comply with NFPA 80 for fasteners of door hardware in fire-rated applications.

- C. Finishes: BHMA A156.18, as indicated in Door Hardware Sets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Steel Doors and Frames: Comply with DHI A115 Series. Drill and tap doors and frames for surface-applied door hardware according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.
- C. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant.
- G. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- I. Installation:
 - 1. Install hardware in accordance with manufacturer's recommendations and instructions.
 - 2. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the fire rating.

3. Install closers on the room side of corridor doors, stair side of stairways, and interior side of exterior doors.

3.2 FIELD QUALITY CONTROL

- A. Hardware shall be in strict accord with the applicable provisions of the ADA-ABA Accessibility Guidelines; the International Building Code, Chapter 11 Accessibility; and the Wisconsin Administrative Code, Chapter Comm 62.
- B. Furnish UL listed hardware for all UL labeled openings in conformance with requirements for the class of opening scheduled.

3.3 DOOR HARDWARE SETS:

NEW DOORS

SET 01

Doors 101 and 102

1	EA	PULL PLATE	8303 [8300 PLATE WITH 8103 PULL]	630	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	DEADBOLT	MS1850S WITH ADA THUMBTURN	628	ADA
1	EA	SURFACE CLOSER	4111 CUSH	652	LCN
1	EA	WALL BUMPER	409	626	RO
1	EA	KICKPLATE	K1062	630	RO
3	EA	HINGES	5BB1 4.5" X 4.5"	652	IVE

SET 02

Door 103

1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	652	LCN
1	EA	WALL BUMPER	409	626	RO
3	EA	HINGES	5BB1 4.5" X 4.5"	652	IVE

SET 03

Door 104

1	EA	OFFICE LOCK	NP80PD	626	SCH
2	EA	SURFACE BOLTS	580-12	630	ROC
4	EA	HINGES	5BB1 4.5" X 4.5"	652	IVE
2	EA	HINGE PIN DOOR STOPS	70A15	619	SCH

SET 04

Door 106 (Pair)

1		INTEGRAL FLUSH BOLT	FB458	26D	IVES
1		LEVER SET	J10 MAR 619	626	SCH
1		INACTIVE LEVER	J170 MAR 619	626	SCH
1		STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	HINGE PIN DOOR STOPS	70A15	619	SCH
3	EA	HINGES	5BB1 4.5" X 4.5"	652	IVE

SET 05

Door 107

1	EA	PANIC HARDWARE	9927NL-OP-F	626	VON
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	WALL BUMPER	409	626	RO
4	EA	HINGES	5BB1 4.5" X 4.5"	652	IVE

SET 06

Door E101

1	EA	PANIC HARDWARE	9927NL-OP-F	626	VON
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	WEATHERSTRIP	160S	A	NGP
1	EA	DOOR SWEEP	200NA	A	NGP
1	EA	THRESHOLD	410S	630	HAG

SET 07

Doors E100 and E102

1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	PANIC HARDWARE	9927NL-OP-F	626	VON
1	EA	THRESHOLD	410S (verify width needed)	630	HAG
1	EA	FACEPLATE	5000 X 501	630	HES
1	EA	ELECTRIC STRIKE	5100	689	VON
1	EA	DOOR SWEEP	200NA	A	NGP
1	EA	WEATHERSTRIP	160S	A	NGP

SET 08

Door E103 (Pair)

1	EA	PANIC HARDWARE	9927NL-OP-F (Active leaf)	626	VON
			9927EO-F (Inactive leaf)	626	VON
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	THRESHOLD	410S (verify width needed)	630	HAG
1		ASTRAGAL			
1		WEATHERSTRIP	160S	A	NGP
1		DOOR SWEEP	200NA	A	NGP
1		COORDINATOR	576	628	RO

SET 09

Door E200

1	EA	LEVER SET	J10 MAR 619	626	SCH
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	DEADBOLT	B80	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	WEATHERSTRIP	160S	A	NGP

END OF SECTION

SECTION 08 83 00

MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Annealed monolithic glass mirrors with stainless steel channel frame.

1.2 SUBMITTALS

- A. Product Data: For mirrors and mounting hardware.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Product Certificates: For each type of mirror, signed by product manufacturer.

1.3 QUALITY ASSURANCE

- A. Glazing Publications: Comply with GANA's "Glazing Manual" and GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors" unless more stringent requirements are indicated
- B. Safety Glazing Products: For tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated in second subparagraph below.
 - 1. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for

- maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
2. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide stainless steel channel frame mirror by one of the following:
 1. Bobrick.
 2. Viacon.
 3. Approved Equal.

2.2 MIRROR FRAME:

- A. Type 430 stainless steel, 1/2" x 1/2" x 3/8" channel with 1/4" return at rear.
- B. All exposed surfaces shall have bright polished finish.
- C. One piece frame with 90 degree mitered corners.
- D. Galvanized steel back with integral horizontal hanging brackets near the top for hanging the mirror and near the bottom to prevent the bottom of mirror from pulling away from the wall.
- E. Locking devices to secure mirror to concealed wall hanger.
- F. In Screw Locking Design, concealed Philips-head locking screws to securely fasten mirror to wall hanger.

2.3 MIRROR

- A. No. 1 quality, 1/4" select float glass.
 1. Selected for silvering.
 2. Electrolytically copper-plated by the galvanic process.
 3. Guaranteed for 15 years against silver spoilage.
- B. Corners protected by friction-absorbing filler strips.
- C. Back protected by full-size, shock-absorbing, water-resistant, nonabrasive, 3/16" thick polyethylene padding.

2.4 CONCEALED WALL HANGER

- A. 20-gauge galvanized steel, incorporating lower support member, forming rigid rectangle, which engages lower backplate louvers to keep bottom of mirror against the wall.

2.5 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

2.6 MIRROR HARDWARE

- A. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- B. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.7 FABRICATION

- A. Mirror Edge Treatment:
 - 1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Mount wall hanger on wall with screws at points indicated. For plaster or drywall construction, provide backing to comply with local building codes, then secure wall hanger with screws.

- D. When providing a concealed backing, allow backing to cover minimum range of mounting hole locations per manufacturer's written instructions.
- E. For other wall surfaces, provide fiber plugs or expansion shields for use with screws, or provide 1/8" toggle bolts or expansion bolts.
- F. Hang mirror on wall hanger with all four backplate louvers engaged behind horizontal wall hanger members.
- G. Snap Locking Design: Locking devices automatically secure mirror to concealed wall hanger when it is lowered into final position.
- H. Screw Locking Design: Lock mirror to wall hanger by tightening Phillips-head locking screws that are concealed in the bottom of frame at points indicated per manufacturer's written instructions.
- I. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- J. Do not permit edges of mirrors to be exposed to standing water.
- K. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

3.2 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean mirrors and adjacent surfaces.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.

1.2 SUBMITTALS

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

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on the same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

- a. Each level of gypsum board finish indicated for use in exposed locations.
- b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.

3. Simulate finished lighting conditions for review of mockups.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Temple-Inland.
 - b. American Gypsum Co.
 - c. G-P Gypsum.
 - d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. USG Corporation.
- B. Type X:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.

2.2 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, or rolled zinc.
 - 2. Shapes:

- a. Cornerbead.
- b. Bullnose bead.
- c. LC-Bead: J-shaped; exposed long flange receives joint compound.
- d. U-Bead: J-shaped; exposed short flange does not receive joints compound.
- e. Expansion (control) joint.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

2.5 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. G-P Gypsum; Georgia-Pacific Ceiling Textures/Vermiculite.
 - b. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
 2. Texture: Orange Peel or Light Orange Peel to be selected by Owner after review of samples of each per Article 1.2.

PART 3 - EXECUTION

3.1 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Where required for fire-resistance-rated assembly, and as indicated on Drawings.

3.2 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. Bullnose Bead: Use at outside corners.
 - 3. LC-Bead: Use where indicated.
 - 4. U-Bead: Use where indicated.

3.3 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view and under wall coverings, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 9 sections.

3.4 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Mix and apply finish using powered spray equipment, to produce a

uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.5 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Ceramic floor and base tile.
2. Waterproof membrane.
3. Metal edge strips.

1.2 REFERENCES

A. The following specifications and standards are incorporated by reference:

1. Tile Council of America, Inc. – “Handbook for Ceramic, Glass and Stone Tile Installation”.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Full-size samples in duplicate for each tile specified.
- C. Grout samples in duplicate indicating color range anticipated, texture.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
1. Joint sealants.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Package, handle, deliver and store at the job site in original unbroken containers in a manner that will avoid damage or contamination.
- B. All containers shall bear grade seals, manufacturer's name, size, color and quantities.

1.6 PROJECT CONDITIONS

- A. Set and grout tile when ambient temperature is at least 50° F and rising.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

- A. Manufacturers: See Room Finish Schedule.
- B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, for types, compositions, and other characteristics indicated.
- C. Ceramic Tile (Floor Tile and Base Tile): See Room Finish Schedule. Verify selections with Owner.

2.2 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

2.3 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.

- B. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; 0.040-inch nominal thickness.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. National Applied Construction Products, Inc.; Strataflex.
 - b. Approved equal.

2.4 SETTING AND GROUTING MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Atlas Minerals & Chemicals, Inc.
 - 2. Boiardi Products Corporation.
 - 3. Bonsal, W. R., Company.
 - 4. Bostik.
 - 5. C-Cure.
 - 6. Custom Building Products.
 - 7. Jamo Inc.
 - 8. LATICRETE International Inc.
 - 9. MAPEI Corporation.
 - 10. Southern Grouts & Mortars, Inc.
 - 11. Summitville Tiles, Inc.
 - 12. TEC Specialty Products Inc.
- B. Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy: ANSI A118.3.
 - 1. Grout Colors: See Room Finish Schedule.
- C. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3.
- D. Organic Adhesive: ANSI A136.1, Type I.
- E. Expansion Joints:
 - 1. Sealant: Two-component sealant shall comply with Federal Specification TT-S-227e; use Type II (non-sag) for joints in vertical surfaces and Type I (self-leveling) for joints in horizontal surfaces.
 - 2. Floors: Shore A hardness greater than 35.
 - 3. Back-Up Strips: Flexible and compressible type of closed-cell foam polyethylene or butyl rubber, rounded at surface to contact sealant and as recommended by sealant manufacturers.
- F. Provide other materials not specifically described but required for a complete and proper installation.

2.5 ELASTOMERIC SEALANTS

- A. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning 786.
 - b. GE Silicones; Sanitary 1700.
 - c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - d. Tremco, Inc.; Tremsil 600 White.

2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge metal.
- C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates, area, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.
- D. Remove protrusions, bumps, and ridges by sanding or grinding.
- E. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- F. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.2 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic, Glass and Stone Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. (See drawings for patterns.) Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Joints in wall tile shall be aligned vertically and horizontally, staggered joints will not be accepted.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Floor Tile: 3/16 inch.
 - 2. Ceramic Base Tile: 3/16 inch.
- G. Lay out tile wainscots to next full tile beyond dimensions indicated.
- H. Rub exposed edges smooth.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile.
- K. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.
 - 1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
- L. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
 - 1. Tile floors in wet areas.
 - 2. Tile floors composed of tiles 8 by 8 inches or larger.
 - 3. Tile floors composed of rib-backed tiles.

- M. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.
- N. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

3.3 CLEANING

- A. After completion, clean all work, point open joints and replace defective work.

3.4 PROTECTION

- A. Close off work spaces to traffic during installation and at least 48 hours after completion of work.
- B. Cover floors with clean building paper before foot traffic is permitted on them. Board walkways shall be placed on floors that are to be continuously used as passageways by workers.
- C. Tiled vertical outside corners shall be protected with board corner strips in areas used as passageways.

END OF SECTION

SECTION 09 51 23

ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Tile: Set of 12 x 12 inch square Samples of each type, color, pattern, and texture.
 - 2. Submit two samples each, 6 inches long, of suspension system main runner.
- D. Product Test Reports.
- E. Maintenance Data.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - b. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.

C. Certificates: Submit manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry the Underwriters Laboratories (UL) classification for NRC, CAC, and AC.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 3.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 3.0 percent of quantity installed.
3. Hold-Down Clips: Equal to 3.0 percent of amount installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and have a stabilized moisture content within the acoustical tile unit manufacturer's recommended limitations.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete and nominally dry, work above ceilings is complete and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical tiles, and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, sprinkler heads and other fire-suppression system components, and partition assemblies.

1.8 WARRANTY

- A. Written warranty executed by the manufacturer, agreeing to repair or replacement of acoustical ceilings that fail within the warranty period. Failures include:
 - 1. Acoustical Tiles: Sagging and warping.
 - 2. Grid Systems: Rusting and manufacturer's defects.
- B. Warranty Period for Acoustical Tiles: Minimum one year from date of Substantial Completion.
- C. Warranty Period for Grid System: Minimum 10 years from date of Substantial Completion.
- D. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Armstrong World Industries, Inc.
 - 2. USG Interiors, Inc.
 - 3. Chicago Metallic Corporation.
 - 4. Approved Equal.
- B. Acoustical Tile Color and Patterns: White, tegular edge.
- C. Acoustical Tile Size: 2' x 2'.

2.2 ACOUSTICAL TILE CEILINGS, GENERAL

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
- B. Tile-Based Antimicrobial Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial solution that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria.
- C. Low-Emitting Materials: Acoustical tile ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- D. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension system of types, structural classifications, and finishes indicated that comply with application requirements in ASTM C 635.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. USG Interiors, Inc.
 - 3. Chicago Metallic Corporation.
 - 4. Approved Equal.
- B. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural, classification and finish indicated which comply with applicable ASTM C 635 requirements. Provide fire resistance rated suspension systems where fire-rated ceilings are required.
- C. Access: upward, with each access unit identified by manufacturer's standard unobtrusive markers.
- D. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
- F. Concrete Inserts: Inserts formed from hot-dipped galvanized sheet steel and designed for attachment to concrete forms and for embedment in concrete, with holes or loops for attachment at hanger wires.
- G. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.
- H. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- I. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

- J. Hold-Down Clips: Manufacturer's standard hold-down clips for grid and edge trim.
- K. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical tiles.
- L. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G3 coating designation, with pre-finished 15/16-inch-wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. Face Design: Flat, flush.
 - 3. Cap Material: Steel or aluminum cold-rolled sheet.
 - 4. Cap Finish: Painted white.
- M. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated, or if not indicated, provide manufacturer's standard molding for corners, edges and penetrations of ceiling that fit type of edge detail and suspension system indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, partitions, walls, and structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage of ceiling system, and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical tile ceilings to comply with ASTM C 636 UBC Standard 25-2, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
 3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
 4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

- G. Install acoustical tiles with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut tiles at borders and penetrations to provide a neat, precise fit.
1. For square-edged tiles, install tiles with edges fully hidden from view by flanges of suspension system runners and moldings.
 2. For reveal-edged tiles on suspension system runners, install tiles with bottom of reveal in firm contact with top surface of runner flanges.
 3. For reveal-edged tiles on suspension system members with box-shaped flanges, install tiles with reveal surfaces in firm contact with suspension system surfaces and tile faces flush with bottom face of runners.
 4. Paint cut edges of tile remaining exposed after installation; match color of exposed tile surfaces using coating recommended in writing for this purpose by acoustical tile manufacturer.
 5. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by tile manufacturer's written instructions, unless otherwise indicated.
 6. Install clean-room gasket system in areas indicated, sealing each tile and fixture as recommended by tile manufacturer's written instructions.
 7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Replace damaged and broken tiles.
- B. Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wall base.
2. Molding accessories.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Johnsonite
2. Flexco.
3. Armstrong.
4. Approved Equal.

2.2 RESILIENT WALL BASE

- A. Wall Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TV (vinyl, thermoplastic).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Flexibility: Will not crack, break, or show any signs of fatigue when bent around a 1/4 inch diameter cylinder.
 - 4. Style: Cove (base with toe).
 - 5. Meets or exceeds the performance requirements for resistance to heat/light aging, chemicals, and dimensional stability when tested to the methods described in ASTM F 1861.
- B. Minimum Thickness: 0.080 inch.
- C. Height: 4 inches.
- D. Lengths: Coils in manufacturer's standard lengths.
- E. Outside Corners: Job formed.
- F. Inside Corners: Job formed.
- G. Locations: See Drawings.
- H. Finish: See Room Finish Schedule. Verify final selection with Owner.
- I. Colors and Patterns: See Room Finish Schedule. Verify final selection with Owner.

2.3 RESILIENT MOLDING ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Johnsonite
 - 2. Flexco.
 - 3. Armstrong.
 - 4. Approved Equal.
- B. Material: Vinyl.
- C. Colors: See Room Finish Schedule. Verify final selection with Owner.

2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 1. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- E. Areas to receive resilient products shall be clean, fully enclosed, weather tight, and maintained at a uniform temperature of at least 65°F for 24 hours immediately before installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Installation work should not begin until the work of all other trades, especially overhead trades, has been completed.
- C. Areas to receive wall base shall be maintained at a uniform temperature of at least 65°F for 24 hours during and for 24 hours after the installation is completed.
- D. The wall base and adhesives shall be conditioned in the same manner.
- E. Floors and walls shall be clean, dry, free of dust, all paints, wallpaper, and all other foreign materials which may affect proper adhesive bonding.
- F. Wall bases shall not be installed on surfaces that will be exposed to drastic temperature changes or moisture.
- G. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

- H. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- I. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- J. Do not stretch wall base during installation.
- K. Vinyl Wall Base: Coiled wall base shall be uncoiled and lay flat for at least 24 hours at 65°F prior to installation.
- L. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and field painting of the following interior items and surfaces.
 - 1. Gypsum board.
 - 2. Wood trim and base.
- B. Related Sections Include:
 - 1. Division 06, Section "Interior Architectural Woodwork".
- C. "Paint" as used herein means all coating systems materials including primers, emulsions, enamels, stains, sealers and fillers and other applied material whether used as prime, intermediate or finish coats.
- D. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

1.2 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semi-gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 SUBMITTALS

- A. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Submit 2 Samples on the following substrates for Architect's review of color and texture only:

- a. Painted Gypsum Board: 6 inch square for each color with sheen, color and texture achieved.
- b. Stained Wood: 4 inch by 6 inch samples of natural- or stained-wood finish on representative surfaces.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in “MPI Approved Products List.”
2. Preparation and Workmanship: Comply with requirements in “MPI Architectural Painting Specification Manual” for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver materials to site until having received all written approvals of submitted information and samples.
- B. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- C. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 1. Keep storage area neat and orderly. Remove oily rags and waste daily.
- D. Take all precautions to insure that workers and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and applications of paint.

1.6 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.
- D. Do not apply paint to surfaces in hot sunlight.

1.7 SEQUENCING AND SCHEDULING

- A. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto newly-painted surfaces.

1.8 EXTRA MATERIALS

- A. Furnish an additional 5 percent, but not less than one (1) gallon of each type/color of paint applied.
- B. All containers shall be sealed for storage and identified with appropriate labels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Sherwin-Williams Company.
 - 2. Benjamin Moore & Co.
 - 3. Diamond Vogel.
 - 4. Hallman Lindsay
 - 5. ICI Dulux Paint Centers (ICI Dulux Paints).
 - 6. Mautz.
 - 7. PPG Industries, Inc. (Pittsburgh Paints).
 - 8. Kelley-Moore Paints.

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable. Use products with low V.O.C. content when available.

- C. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - 2. Nonflat Paints, Coatings and Primers: VOC content of not more than 150 g/L.
 - 3. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 - 4. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.

2.3 INTERIOR PAINTS

- A. Latex; MPI INT 9.2M.
- B. VOC Content: E Range of E1.

2.4 EQUIPMENT

- A. Provide all brushes, rollers, ladders, scaffolding and other equipment of any kind to properly execute each type of work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Maximum Moisture Content of Substrates:
 - 1. Gypsum Board: 12 percent.
 - 2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
- E. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- C. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- D. Gypsum Board: Fill minor irregularities with patching material and sand to smooth level surfaces taking care not to raise nap of paper.
- E. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - 1. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
- F. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.

4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- C. Do work under adequate illumination and dust-free conditions.
1. Apply paint by brush, roller or spray methods except where particular method will produce unsatisfactory results. Where spray method is used on concrete block, follow with roller to work paint into voids.
- D. Materials.
1. Do not open containers until required for use.
 2. Stir materials thoroughly and keep at uniform consistency during application.
- E. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- F. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- G. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for all final coats.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

- A. During the progress of this work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 INTERIOR PAINT SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex.
 - i. Walls: Eggshell Finish
 - d. Colors: See Room Finish Schedule. Verify selections with Owner.

3.7 STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stained Woodwork: Provide the following stained finished over new interior trim and base woodwork:

1. Waterborne Clear Acrylic Over Stain Systems: MPI INT 6.3W. Two finish coats of waterborne clear acrylic varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.
 - a. Filler Coat: Open-grain wood filler.
 - b. Stain Coat: Interior wood stain (semitransparent).
 - c. Color: As selected by Owner.
 - d. Sealer Coat: Clear sanding sealer.
 - e. Finish Coats: Interior polyurethane-based clear satin varnish.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Steel toilet compartments configured as toilet enclosures and urinal screens.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for blocking.
2. Division 10 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, soap dispensers, and similar accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted toilet accessories.

C. Samples for Initial Selection: For each type of unit indicated.

1.3 QUALITY ASSURANCE

A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

B. Surface Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Comply with applicable provisions in the U. S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities," ICC/ANSI A117.1, and all applicable state and local accessibility requirements for toilet compartments designated as accessible.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
 - 1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z (03G).
 - 2. Hot-Dip Galvanized: ASTM A 653/A 653 M, either hot-dip galvanized or galvanized.

2.2 STEEL UNITS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Accurate Partitions Corporation.
 - 2. All American Metal Corporation.
 - 3. American Sanitary Partition Corporation.
 - 4. Bradley Corporation.
 - 5. Flush Metal Partition Corp.
 - 6. General Partitions Manufacturing Corp.
 - 7. Approved Equal.
- B. Toilet Enclosure Style: Floor anchored and overhead braced.
- C. Urinal-Screen Style: Wall hung.
- D. Doors, Panels, Urinal Screens, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.

2. Grab Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
- E. Urinal-Screen Construction:
1. Flat-Panel Urinal Screen: Matching panel construction.
 2. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches thick.
- F. Facing Sheets and Closures: Electrolytically coated or hot-dip galvanized-steel sheet with nominal base-metal (uncoated) thickness standard with manufacturer.
- G. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 3 inches high, finished to match hardware.
- H. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- I. Brackets (Fittings):
1. Full-Height Continuous Type: Manufacturer's standard design; for both urinal and toilet partitions; stainless-steel.
- J. Steel Sheet Finish: Manufacturer's standard baked-on-finish, with one color in each room.
1. Color: See Room Finish Schedule. Verify selection with Owner.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.
 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
 3. Latch and Keeper: Manufacturer's standard latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of posts. Provides shoes and sleeves (caps) at posts to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch wide in-swinging doors for standard toilet compartments and 36-inch wide out-swinging doors with a minimum 32-inch wide clear opening for compartments indicated to be accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Stirrup-Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.
- D. Wall-Hung Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

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SECTION 10 28 00

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Public-use bathroom accessories.
- B. Related Sections include the following:
 - 1. Division 8 Section "Mirrors."

1.3 REFERENCES

- A. All work of this section shall be in strict accordance with Wisconsin Administrative Code Chapter Comm 62, ICC/ANSI A117.1, the International Building Code, and the ADA-ABA Accessibility Guidelines.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: Located on Drawings.

PART 2 - PRODUCTS

2.1 BATHROOM ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Bathroom Accessories, Inc.
 - 2. Basco, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Franklin Brass Manufacturing Co.
 - 5. General Accessory Manufacturing Co. (GAMCO).
 - 6. McKinney
 - 7. Traymor Industries Inc.
- B. Public-Use Bathroom Accessories:
 - 1. Double toilet paper holder.
 - 2. Grab bars.
 - 3. Wall mounted soap dispenser.

4. Paper towel dispenser.
5. Sanitary napkin disposals, to be located inside women's toilet compartments.
6. Baby changing stations: See Drawings for size limitations.

2.2 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal access keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446. Provide solid blocking in wall framing.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective units. Remove temporary labels and protective covering.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 10 44 16

FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fire Extinguishers.
 - 2. Cabinets.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Operation and maintenance data.
- E. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.
- C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- E. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
2. Warranty Period: Six (6) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturer's standard materials.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Larsen's Manufacturing Company.
 - b. Or approved equal.
 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: UL-rated, dry chemical in manufacturer's standard enamel container.
- C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

2.3 FIRE PROTECTION CABINETS

- A. Cabinet Type: Suitable for fire extinguisher.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Larson 2409, full glass door.
 - b. Or approved equal.
- B. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.

1. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
- C. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.
- D. Cabinet Material: Steel sheet.
- E. Door Material: Steel sheet.
- F. Door Style: Fully glazed, frameless, backless, acrylic panel.
- G. Door Glazing: Clear float glass.
- H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type and door material and style indicated.
- I. Finishes:
 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet and door except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
 2. Steel: Baked enamel or powder coat.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.4 ACCESSORIES

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
- C. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
- D. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 1. Identify fire extinguishers in fire protection cabinets with the words "FIRE EXTINGUISHER."
 - a. Location: Applied to cabinet door.
 - b. Application Process: Pressure-sensitive vinyl letters
 - c. Lettering Color: Red.
 - d. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- C. Install fire protection cabinets in locations and at mounting heights indicated.
- D. Fire Protection Cabinets: Fasten cabinets to structure square and plumb.
- E. Adjust fire protection cabinet doors to operate easily and without binding. Verify that integral locking devices operate properly.
- F. Mount fire extinguishers in cabinets so the top of the extinguisher is not more than 4 feet above the floor.
- G. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb.
- H. Identification: Apply vinyl lettering at locations indicated.
- I. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- J. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 12 35 30

RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Solid surface vanities with integral bowls.
 - 2. Alternate Bid #2: Plastic laminate countertop in Kitchenette 105.

1.2 SUBMITTALS

- A. Shop Drawings: For countertops. Include plans, elevations, details, and attachments to other work. Include countertop layout for each location, details of countertop construction, including backsplash and edge details, and type of core substrate material. Show materials, finishes, filler panels, hardware.
- B. Samples: For each type of material exposed to view.

1.3 QUALITY ASSURANCE

- A. Field Measurements Countertops: Verify dimensions of construction to receive countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

1.4 COORDINATION

- A. Coordinate work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace cabinets and countertops with material or workmanship defects within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COUNTERTOPS – ALTERNATE BID

- A. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 - 1. Plastic-Laminate Countertop: See Room Finish Schedule. Verify selection with Owner.

2.2 VANITIES WITH INTEGRAL BOWLS

- A. Solid Surface Material: Homogeneous filled polyester, acrylic-modified, cast-polymer solid surface. Colors and patterns run all the way through the product. A repairable and renewable surface.
 - 1. Solid surface vanities with integral bowls.
 - a. See Room Finish Schedule. Verify selection with Owner.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

2.4 FABRICATION

- A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 1. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
- B. Plastic-Laminate Countertops:
 - 1. High-Pressure Decorative Laminate Grade: HGS.
 - 2. Colors, Patterns, and Finishes: See Room Finish Schedule. Verify selection with Owner.
 - 3. Edge Treatment: Same as laminate cladding on horizontal surfaces.
 - 4. Provide backer sheets on underside of all countertops, regardless of core thickness or unsupported area.
 - 5. Core Material at Sinks: Particleboard made with exterior glue or exterior-grade plywood.
 - 6. Post-rolled leading edge and integral 4 inch backsplash.
- C. Solid-Surface Material Vanities:
 - 1. Vanity tops, aprons and splashes of 3/4 inch thick solid polymer material, integral backsplash and end splashes.
 - 2. Vanity tops with integral bowls.

3. Adhesively joined with inconspicuous seams, edge details, as indicated on Drawings.
4. Color: See Room Finish Schedule. Verify selection with Owner.

PART 3 - EXECUTION

3.1 INSTALLATION OF COUNTERTOPS AND VANITIES

- A. Assemble countertops and vanities, and complete fabrication at Project site to the extent that it was not completed in the shop.
 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
- B. Field Jointing: Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.
 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- C. Install countertops and vanities level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut countertops and vanities to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop and vanity.
 1. Install countertops and vanities with not more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanent elastic sealing compound recommended by countertop and vanity material manufacturer.

3.2 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Repair damaged and defective work.
- C. Leave all surfaces clean and without defects.

END OF SECTION

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SECTION 21 00 00

FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This outline specification for fire protection work is a "Performance" specification and intended to be an expression of the design intent and criteria, and is not intended to be complete, encompassing or proprietary to any equipment or product. The Fire Protection Contractor shall prepare drawings in accordance with the basic design shown on the Plumbing-Fire Protection Drawings and Specifications, herein, per IBC, and NFPA 13.
1. Fire Protection Contractor shall finalized Fire Protection Drawings and calculations, submit for approval from state/city and local authorities having jurisdiction.
 2. Fire Protection Contractor shall be responsible for complete system as amended or required by state and local authorities, as well as, obtain necessary approvals for installation of the fire protection system.
 3. Fire Protection System design shall be performed by a state of Wisconsin certified fire protection designer and related fire protection design drawings and calculations shall be sealed by the Fire Protection Designer.
- B. Work includes furnishing of all labor, materials, equipment and performing all operations necessary to install Fire Protection Systems, including piping, fittings, valves, hangers and any other supplemental items necessary to complete the Fire Protection System.
- C. *Work Included:*
1. Sprinkler system design, approved drawings, submittals and calculations;
 2. Automatic sprinkler NFPA 13 system;
 3. Wet fire protection system.
- D. *Coordination of Work by Others:*
1. Combination 8" potable and fire protection water service to the facility is existing.
 2. Cutting and patching of openings for new fire protection piping shall be the responsibility of the Fire Protection Contractor.
 3. Exterior Fire Alarm audio/visual device and Fire Department Connections shall meet the requirements of the Village of Waunakee Fire Department.
 4. Supervision of flow switches, valves, and related shall be provided by the Electrical Contractor as part of the fire alarm system.

1.2 QUALITY ASSURANCE

- A. **CODES:** The plumbing systems for this facility will meet all codes and standards set forth in the Wisconsin Administrative Codes, Village of Waunakee, local codes, national codes and related, including but not limited to the following:
1. IBC Section 903 Automatic Sprinkler Systems;
 2. NFPA 13;
 3. NFPA 14.

- B. Prior to installation, complete working drawings and calculations must be approved by the City of Town of Madison Fire Department and Fire Marshall. Approved drawings must then be presented to Architect for approval.
- C. Hydraulic Calculations and Pipe Sizing: All Fire Protection piping distribution and standpipe requirements shall be hydraulically sized in accordance with NFPA 13, using approved calculation software and protection criteria as shown on the Drawings and specified herein.
- D. DESIGN CRITERIA:
 - 1. Measured static water pressure = To be determined.
 - 2. Measured residual water pressure = To be determined.
 - 3. Measured Flow rate = To be determined.
 - 4. Verify final design criteria with approved flow tests at site.
- E. Occupancy/Protection Classifications:
 - 1. NFPA 13 - Light Hazard Protection: All common spaces.
 - 2. NFPA 13 - Ordinary Hazard Protection - Group I: Mechanical rooms, electrical rooms and storage rooms.

1.3 DESIGN CONCEPT

- A. Common Areas: Automatic Sprinkler System: NFPA 13 complete coverage, fast-response upright, side-wall, semi-recessed heads.
- B. Fire Department Connection and Alarm Audio-Visual Device.
- C. Double check backflow preventor on fire protection water supply.
- D. Zones:
 - 1. Wet sprinkler system

1.4 IDENTIFICATION

- A. Valve Tags: Identify each valve in system with valve tags in conformity with Fire Underwriters and City of Ft Atkinson Fire Department's requirements.
- B. Operational Tags: Identify and tag operational control, maintenance, testing and safety equipment for the fire protection system with operational tags in conformity with NFPA, UL, Fire Underwriters and City of Ft Atkinson Fire Department's requirements.
- C. Charts: Furnish three charts, listing all valves and operational equipment, giving their location in building and their function in the system. One chart with glass cover and neat frame; two charts, without frames, delivered to Architect.

1.5 CLEANING OF PIPING SYSTEMS AND EQUIPMENT

- A. At completion of the work, remove protective material from all equipment, all paint and plaster splatterings, and clean entire piping systems under this section of work; all items shall be left clean and ready for use.

1.6 TESTS

- A. Parts of completed system shall be subjected to hydrostatic pressure test at 200 pounds per square inch for minimum two-hour period. Prior to testing any portion of the system, Contractor shall notify Construction Inspector and City Inspector to witness test and sign Contractor's test certificates.
- B. Perform required fire protection testing per NFPA and Town of Madison Fire Department's requirements.

1.7 SHOP DRAWINGS

- A. Submit to Architect six (6) copies for approval for:
 - 1. Sprinklers heads;
 - 2. Fire protection piping and fittings;
 - 3. Fire protection valves, backflow preventors, and specialty fittings;
 - 4. Fire department connections;
 - 5. Flow switches;
 - 6. Related equipment;
 - 7. Approved Fire Protection System Installation Drawings
 - 8. Approved Hydraulic Calculations

1.8 OPERATING INSTRUCTIONS

- A. Contractor shall furnish Owner with two(2) complete sets of printed instructions and/or data covering the proper operation and maintenance of all equipment furnished under these specifications. Contractor shall instruct Owner's representative in operation, maintenance, testing and safety operations of all fire protection equipment. Training time shall be a minimum of 4 hours.

1.9 CUTTING AND PATCHING

- A. Perform all cutting and patching including necessary materials required, unless noted otherwise.

1.10 HOUSEKEEPING AND CLEANUP

- A. Periodically remove waste materials and leave areas of work broom clean.

1.11 FLOOR, WALL AND ROOF PENETRATIONS

- A. Coordinate the location of openings, chases, furred spaces, etc., with the appropriate contractors. Provide all sleeves and inserts. Penetration through fire and smoke rated construction shall maintain the integrity of that construction.

1.12 EQUIPMENT ACCESS

- A. Install all work to permit access to equipment for maintenance. Require access doors to be of a style applicable to the surrounding surface.

1.13 EQUIPMENT SUPPORTS

- A. Provide all supporting steel not indicated on the Drawings as required for installation of equipment and materials, including angles, channels, beams, hangers, etc.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION PIPING

- A. Schedule 10 and 40 black and galvanized steel pipe;
 - 1. Welded, threaded or mechanical joint fittings.
- B. Copper tube, type K, L or M;
 - 1. Soldered, threaded or mechanical joint fittings.
- C. Fire and smoke rated schedule 40 CPVC plastic piping;
 - 1. Solvent welded joints and fittings.
- D. Standpipes and mains shall be schedule 40 welded or mechanical joint fittings.
- E. UL approved flexible piping extensions may be used for final connections to heads.

2.2 VALVES

- A. All valves must be approved by NFPA.
- B. Gate Valves: All gate and globe valves 2" and smaller shall be brass or bronze.
- C. All valves 2-1/2" in size or larger shall be of the OS&Y flanged type, 175 psi working pressure.

2.3 HANGERS AND SLEEVES

- A. Hangers: Provide all necessary approved hangers in place for supporting the sprinkler piping.
- B. Sleeves: Pipe sleeves to be Schedule 40 galvanized steel pipe flush with wall and ceiling surfaces.
- C. Seal all openings around sleeves with fiberglass and silicone caulking.
 - 1. Provide fire stopping caulk and approved assemblies at rated penetrations.

2.4 SPRINKLER HEADS

- A. Unfinished areas: Upright cast brass head.

- B. Exposed ceiling areas: Upright and sidewall cast brass sprinklers.
- C. Gypsum board and acoustic suspended ceilings areas: Pendant sprinklers shall be semi-recessed, height adjustable, white finish with white finished trim plate. Center heads in 2x2 ceiling tiles, where applicable.

2.5 FIRE PROTECTION EQUIPMENT

- A. Siamese fire department connection;
- B. Flow switches with auxiliary FA contacts;
- C. Double-check valve backflow preventor- Wisconsin approved - existing;
- D. Supervisor switches with auxiliary FA contacts;
- E. Alarm Audio-Visual, exterior;
- F. Auxiliary Equipment:
 - 1. Pressure gauges;
 - 2. Sight and test drains;
 - 3. Auxiliary drains;
 - 4. Line tester;
 - 6. Related fittings and valves per NFPA 13 and 14.

PART 3 – EXECUTION

3.1 EXECUTION

- A. Water service to automatic sprinkler system shall be provided by the Plumbing Contractor to inside the building with a blind flange for continuation by the Fire Protection Contractor as indicated on Contract Drawings and Specified herein.
- B. Branch piping, tamper and flow switches shall be provided at each zone.
- D. Turn over required fire bells to Electrical Contractor for wiring at locations necessary.
- E. Provide final testing requirements per NFPA 13, 14 and Local Fire Department's requirements.
- F. Arrange for main and auxiliary drains to be discharged to exterior areas, floor drains or open site drains as approved by the Architect.
 - 1. Provide and arrange for routing auxiliary drains lines to the lowest level open site drains by the Plumbing Trade or to approved exterior discharge.

3.2 IDENTIFICATION

- A. Identify all piping and equipment as specified and required per NFPA 13, 14 and by the local Fire Department.

END OF SECTION

SECTION 22 00 00

PLUMBING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide plumbing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
1. Domestic Hot and Cold Water Piping;
 2. Drain, Waste, and Vent Systems;
 3. Natural Gas Distribution Systems;
 4. Plumbing Fixtures and Trim;
- B. Related Work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- C. Work of Other Sections:
1. Openings for new Plumbing work in new construction walls, floors, roof, ceiling, etc. shall be provided by the General Contractor. Location and size of these openings shall be the responsibility of the Plumbing Contractor.
 2. Electrical line voltage wiring (110 volts and greater) by the Electrical Contractor. Wiring diagrams shall be furnished to the Electrical Contractor by the Plumbing Contractor.
 3. Final gas piping connections for HVAC Equipment by the HVAC Contractor.
 4. Roofing, exterior wall and related exterior openings shall be caulked, sealed and patched by the General Contractor.

1.02 GENERAL PROVISIONS

- A. This specification Section is a general description of the work requirements. The particular descriptions are not intended to be all inclusive. Bidders shall also refer to the Drawings.
- B. Prior to submitting a bid, the Contractor shall call the Engineer's attention (in writing only) to any materials or items of work believed to be inadequate. Bidders are required to visit the premises, take measurements, inspect existing conditions and limitations, and obtain first hand information necessary to submit a bid. The intent of the Contract is to obtain complete system installations, tested, ready for operation. No extras will be allowed because Contractor's misunderstanding of the scope work involved.
- C. Everything essential for the completion of the work implied to be covered by these Specifications to make the system ready for normal and proper operation must be furnished and installed by this Contractor. Accordingly, any omission from either the plans or the Specifications, or both of details necessary for the proper installation and operation of the system shall not relieve this Contractor from furnishing such detail in full and proper manner.
- D. The Drawings show various details indicating the general arrangement of the plumbing work, sizes and locations of piping, equipment, etc. The said Drawings with figures, lettering, etc., shall be considered a part of these Specifications and no charge or alternation shall be made in any case unless ordered by the Engineer.

- E. In addition to the Plumbing work, refer to the Plumbing work shown on the general Construction Drawings of the building as being part of this Contract, unless specified to be completed by other contractors.

1.03 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen 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.
- B. Without additional cost to the Owner, provide such other labor and materials as required to complete the work of the Section in accordance, with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in the Contract Documents.
- C. In acceptance or rejection of installed work, the Architect or Engineer shall make no allowance for lack of skill on the part of the Workmen.
- D. For the actual field fabrication, installation and testing of the Plumbing work, use only thoroughly trained and experienced workmen complete familiar with the items required and manufacturer's current recommended methods of installation.

- E. Reference Standards:

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing and Material
AWWA	American Waterworks Association
CISPI	Cast Iron Soil Pipe Institute
FM	Factory Mutual
MCA	Mechanical Contractors Association
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
WQA	Water Quality Association

1.04 CODES AND PERMITS

- A. This contractor must comply with building codes and other ordinances in force where the building is located as far as it apply to his work.
 - 1. Engineer will provide approved plumbing plans from the Municipality or State having jurisdiction.
- B. Plumbing work shall meet all Federal, State, Local Codes, ordinances and utility regulations.
 - 1. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Engineer.

- C. Plumbing Contractor must secure permits from proper offices and pay all legal fees as may be necessary for fulfilling the requirements of these specifications.
- D. Submit one (1) copy of all permits to the Owner.

1.05 COORDINATION

- A. Cooperate and coordinate with other trades to assure that all systems pertaining to the Plumbing work shall be installed in the best feasible arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.
- B. Arrange plumbing work in neat, well organized manner with piping and similar services running with primary lines of building construction, and with minimum of 8 foot overhead clearance, where possible.
- C. Locate equipment properly to provide easy access, and arrange entire Plumbing Work with adequate access for operation and maintenance.
- D. Give right-of-way to piping which must slope for drainage.
- E. Where Plumbing work is to connect to existing, the Contractor must field verify all connection points before beginning any rough-in work. Verify gravity flow lines and proper invert elevations required prior to starting piping installation.
- F. Coordinate site utility requirements with Site Contractor, along with inverts required to building.

1.06 ELECTRICAL PROVISIONS OF PLUMBING WORK

- A. Line Voltage Wiring: The Electrical Contractor is to make all line voltage (100 volts and greater) electrical wiring connections for hookup of the units and systems.
- B. Low Voltage Control Wiring: Exposed low voltage (less than 100 volts) temperature control wiring in connection with the Plumbing systems shall be in EMT conduit by the Plumbing Contractor in strict accordance with the applicable sections of the Electrical Specifications. *Concealed low-voltage control* wiring may be routed to equipment without conduit, unless subject to physical damage.
- C. The Plumbing Contractor shall consult with the Electrical Contractor before ordering electrical motors, to ascertain correct electrical current characteristics. Plumbing Contractor shall furnish complete list and location of equipment requiring electrical connections and necessary wiring diagrams to the Electrical Contractor.
- D. Motors: Where not otherwise indicated, comply with applicable provisions of the National Electrical Code, NEMA Standards, and sections of Division 16 of Specifications.
 - 1. Phases and Current: 1/6 HP and smaller is Contractor's option; up to 1/3 HP, capacitor-start, 120 volt, 60 cycle single-phase; 1/2 HP and larger, squirrel-cage induction NEMA rated 200 volt, three-phase, 60 cycle. Provide 2 separate windings on 2 speed three-phase motors. Coordinate with actual current characteristics; refer to Division 16 of Specifications.
 - 2. High Efficiency Motors: All motors 1 HP and larger shall be high efficiency motors meeting or exceeding values tested in accordance with IEEE Standards 112, Method B procedures as stated in NEMA MG 1-12.53a.
 - 3. Temperature Rating: Class B insulation for 70 degree C temperature rise.
 - 4. Service Factor: 1.15 for three-phase; 1.35 for single-phase.
 - 5. Construction: General purpose, continuous duty.

6. Frames: NEMA Standard for horsepower specified.
 7. Overload Protection: Built-in thermal, with internal sensing device for stopping motor, and for signaling where indicated.
 8. Bearings: Permanently lubricated and sealed ball bearings.
- G. Motor Starter & Disconnect Switches: Where motor starters and disconnect switches are indicated to be an integral part of equipment furnished by Plumbing Contractor, they shall meet requirements of Division 16 and shall be connected by the Electrical installer.
1. Field assembled motor starters and disconnect switches are to be the responsibility of the Electrical Contractor, unless indicated otherwise.
- F. Wiring Connections: Wired connections in flexible conduit, except where plug-in electrical cords are indicated and permitted by governing regulations.
- G. General Wiring: Comply with applicable provisions of Division 16 Section.
- H. Drip Pans: Furnish drain pans below piping which passes directly above electrical work. Install drain piping and drain valve.

1.07 PAINTING PLUMBING WORK

- A. General: All field painting of plumbing equipment shall be done by the General Contractor, unless equipment is specified otherwise or is to be furnished with factory-applied finish coats.
1. Field paint all exposed roof DWV and heater vents to match color recommended by Architect.
- B. All equipment shall be provided with factory-applied prime and final coat paint finish, unless otherwise specified.
- C. If factory-applied paint finish in any Plumbing equipment furnished by the Plumbing Contractor is damaged in shipment or during construction of the building, the equipment shall be refinished by the Plumbing Contractor to the satisfaction of the Architect or Engineer.
- D. Prime paint all field-fabricated metal work under Plumbing work, comply with applicable provisions of Division 9.

1.08 PLUMBING SYSTEM IDENTIFICATION

- A. General: Provide adequate marking of plumbing system and control equipment to allow identification and coordination of maintenance activities and maintenance manuals.
1. Furnish and install adequate marking, tagging and labeling of all *accessible and exposed* Plumbing equipment, piping and control devices, per ANSI A13.1-1981. Accessible locations shall include all ceiling spaces above accessible ceilings.
- B. Equipment: Identify all major Plumbing equipment with plastic-laminate signs of 2" high painted stencils and contrasting background. Provide text of sufficient clarity and lettering to convey adequate information at each location and mount permanently. Identify control equipment by 1-1/2" x 4" plastic laminate nameplates with 1/4" high lettering.
- C. Piping: Identify piping once every 30 feet at each branch, at termination of lines, and near valve or equipment connections. Place flow directional arrows at each piping identification. Provide lettering

of the appropriate size to convey information on wrap-around signage, adhesive-backed or paint stenciled labels.

- D. Valves: Identify all valves with 1-1/2" diameter polished brass tags with stamp-engraved labels or plastic laminate tags. Prefix or color-code tags for each generic piping service. Prepare and submit valve tag schedule, listing location, service and tag description, and incorporate in Instruction Operations Manual.
- E. Operational Labels: Where needed for proper or adequate information on operation and maintenance of plumbing systems, provide tags or labels of plasticized or laminated card stock, typewritten to convey the message.

1.09 FLOOR, WALL, ROOF AND CEILING OPENINGS

- A. The General Contractor will be required to leave openings in ceiling, floors, walls, roof, partitions, etc., as required to install the Plumbing work specified or shown on the Drawings. The Plumbing Contractor is responsible for correct size and location of his openings. Where penetrations through existing construction are required, they shall be the responsibility of the Plumbing Contractor.
 - 1. Pipe Sleeves: Schedule 40 black steel pipe, 1" larger than carrier pipe.
- B. The Plumbing Contractor shall set sleeves and anchors for all equipment, etc., and shall provide watertight seals on pipes through exterior walls, floors and roof and where noted on the Drawings.
 - 1. Interior Sound Wall Penetrations: All duct and piping penetrating sound walls shall be sleeved and sealed with fiberglass insulation and caulked for sound and odor control. Verify all required sound wall locations with Architect/General Contractor prior to bidding.
- C. Pack annular space between sleeves and pipe with fiberglass insulation and seal with approved caulking materials. Where penetrations occur through fire-rated walls or floors, fill space with fire-resistive insulation similar to high-temperature mineral wool, US Gypsum Thermafiber batts or Cera-blanket FS insulation by Tremco. Seal openings with fire-resistive fire stop caulk/sealant.
 - 1. Fire-proof plastic piping through fire-rated construction per approved UL listed assembly.
- D. Provisions for openings, holes and clearances through walls, floors, ceilings and partitions to be made in advance of construction of such parts of the building.
- E. If the Plumbing Contractor should neglect to inform the General Contractor of his opening requirements and that portion of the Building construction has been completed, the Plumbing Contractor shall pay the General Contractor for providing such openings.
- F. Make arrangements with various other contractors for all special framing, spacing and chases. Mason will leave chases in mason work, but Plumbing Contractor is responsible for correct size and location.

1.10 CUTTING AND PATCHING

- A. General: Refer to Division 1 General Requirements.
- B. Perform all cutting and patching required for complete installation of the HVAC systems, unless specifically noted otherwise. Provide all materials required for patching unless otherwise noted.

1. All cutting and patching necessary of structural members to install any plumbing work shall not be done without permission, and then only carefully done under the direction of the Architect and General Contractor.
- C. The Contractor shall not endanger any work of other trades by a demolition, cutting, digging or otherwise. Any cost caused by defective or ill-timed cutting and patching work shall be borne by the contractor responsible. Each contractor requiring cutting and patching shall hire men skilled in such cutting and patching to do the work.
1. All patching work in existing areas shall match existing work and restore the finish to its original condition in material, quality, texture, finish and color unless specifically noted or scheduled otherwise.
- 1.11 TESTS AND INSPECTIONS:
- A. All plumbing tests shall be conducted in the presence of and to the satisfaction of the Governing Authorities, Architect/ Engineer, and Owner or his authorized representative.
- B. The Plumbing Contractor shall be responsible for applying tests and ordering inspections as required by Federal, State and local Code and Inspection authorities.
1. All work shall remain exposed until it has been tested, inspected and approved.
- 1.12 TEMPORARY SERVICES
- A. Provide temporary services for all plumbing services to the existing facility to maintain function of sanitary, storm, natural gas and water services during the construction period.
- 1.13 TRENCHING AND BACKFILLING
- A. Trench, excavate and tunnel to place all piping and other related work necessary at the elevations indicated or required, as shown on the Drawings.
1. Cut bottom of trench to grade, make trench 12” wider than the widest dimension of the pipe.
 2. All pipes shall be laid on a compacted bed of sand 6” deep. Do not lay piping on large stones, rocks or bricks.
- B. Backfill in layers and compact sufficiently to prevent settlement. Backfill with damp sand and fine gravel mixture.
1. Exterior locations shall be backfilled to 12” of grade with sand and fine gravel mixture and the remainder with native compacted topsoil.
 2. Do not start backfill operations until plumbing work has been properly inspected and approved.
- 1.14 CONCRETE FOR PLUMBING WORK
- A. General: Comply with pertinent provisions of Division 1 and Division 3.
- B. All concrete work for equipment pads by the Plumbing Contractor.
- C. Concrete Equipment Pads: For each piece of floor or ground mounted plumbing equipment as indicated on the Drawings, provide a 4” concrete housekeeping pad at a minimum of 4 inches wider

than the full size of the respective equipment's base. Equipment pads are required for the following equipment:

1. Water heater;
2. Softener/brine tank.

1.15 EQUIPMENT ACCESS

- A. General: All valves, equipment and accessories shall be installed to permit access to equipment for maintenance, servicing or repairs. This Contractor at no additional cost shall complete relocation of piping, or equipment to accomplish equipment access.
- B. Location: Provide access doors where equipment is located in chases or inaccessible locations. Access panels shall be furnished by this Contractor and installed by the specific trade responsible for the material in which the access panels are installed.
- C. Construction: Access doors in fire-rated construction must have UL label. Access doors shall be of size to provide adequate access to equipment concealed in wall, ceiling and furred-in spaces. Milcor or approved equal, 14-gauge steel frame and door, prime-coated, except stainless steel in areas subject to excessive moisture.

1.16 EQUIPMENT SUPPORTS

- A. General: Provide all supporting steel and related materials not indicated on structural drawings as required for the installation of equipment and materials, including angles, channels, beams and hangers.
 1. Prime coat paint all metal supports.

1.17 EQUIPMENT GUARDS

- A. General: Provide equipment guards over belt-driven assemblies, pump shafts, exposed fans and related elsewhere, as indicated in this specification or required by Code.
 1. All belt guards shall be OSHA-approved type.

1.18 GUARANTEE

- A. All material and workmanship must be new and first class in every respect; the plumbing equipment must be turned over to the owner in complete working order and free from mechanical or performance defects.
- B. The Plumbing Contractor must guarantee all labor and materials for one (1) year from the completion of the plumbing system. Maintain and repair plumbing equipment for the above period, unless such defects are clearly the result of bad management after plumbing system is turned over to the Owner.
- C. Before final acceptance of the plumbing work, the Plumbing Contractor shall have the entire apparatus and system in complete and satisfactory operation and shall maintain same in satisfactory and continuous operation for a period of ten days prior to the date of acceptance; fuel to be furnished by Owner.
- D. The Plumbing Contractor shall submit to the Engineer in triplicate, at the completion of his work, a certified statement, signed by a principal of the firm, stating that the system has been fully installed and is operating within the intent of the Drawings and Specifications and that all system components have

been tested and adjusted. This statement shall be submitted before the system is presented to the Owner for final inspection.

1.19 SUBMITTALS

- A. Refer to Division 1 for additional submittal requirements.
- B. The Plumbing Contractor will be held responsible for correction of work deemed necessary by the Engineer due to proceeding with the work without shop drawings that have the Architect/Engineers final approval.
- C. Shop drawings shall include data on physical dimensions, gauges, materials of construction and capacities.
 - 1. Incomplete drawings will be disapproved.
- D. This Contractor will be responsible for all figures and dimensions shown on the shop drawings. Approval of shop drawings describing equipment that cannot fit in the space allotted does not relieve this Contractor from providing equipment that will meet the space requirements.
- E. Submit electronic PDF copies of shop drawings with file names associated with equipment submitted along with proper markup of electronic submittals to the Architect/Engineer for approval, with complete detail for all equipment, materials, etc., to be furnished and installed for this project as follows:
 - 1. Valves;
 - 2. Pipe and piping specialties;
 - 3. Insulation systems;
 - 4. Plumbing fixtures;
 - 5. Water heater;
 - 6. Water Softener;
 - 7. Instructions and O&M manuals(2 copies);
 - 8. As-built Drawings.

1.20 HOUSEKEEPING AND CLEANUP

- A. Periodically as work progress and/or as directed by the Architect/Engineer, the Contractor shall remove waste materials from the building and leave the area of the workroom clean. Upon completion of work remove all tools, scaffolding, broken and waste materials, etc., from the site.

1.21 LUBRICATION

- A. Upon completion of the work and before turning over to the Owner, clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacturer.
 - 1. The Contractor is responsible for maintaining lubrication of all mechanical equipment under his contract until work is accepted by the Owner.
- B. Furnish a chart with each piece of equipment listed, itemizing location for lubricant required and recommended periods of lubrication. Incorporate chart in Instruction Manual.

1.22 INSTRUCTIONS AND MANUALS

- A. Upon completion of the installation, but before final acceptance of the system, the Plumbing Contractor shall instruct the Owner on the care and operation of all parts of the Plumbing system.
- B. Assemble two (2) complete sets of manufacturer's printed operating and maintenance instructions for all mechanical equipment and installed under this contract. Prepare in bound copies complete with index tabs. Information must include parts lists, equipment warranties, and wiring diagrams. Submit bound copies to Architect for disbursement.

1.23 AS-BUILT DRAWINGS

- A. During construction maintain a set of prints showing installed as-built work for the project.
- B. Upon completion of construction before final acceptance, provide a set of as-built drawings to the Architect/Engineer.

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPE SCHEDULE

A. Above Ground Piping:

- 1. Type 'L' copper water tube, H(hard drawn) temper, ASTM B88; with cast copper fittings, ANSI B16.18; wrought copper fittings, ANSI B16.22; lead-free(less than 0.2%) solder, ASTM B32; flux ASTM B813.
- 2. PEXa tubing approved for potable water piping: Crosslinked Polyethylene, ASTM F876 & ASTM F877. Fittings: Insert type fittings with cold flaring memory type fittings equal to Uponor. Crimp or compression ring fittings will not be allowed.
- 3. Copper mechanical grooved fittings and couplings on roll grooved pipe(propress) may be used in lieu of soldered fittings.

B. Below Ground: 2-1/2" and Smaller:

- 1. Type 'K' copper water tube, O(annealed-soft) temper, ASTM B88; with cast copper fittings, ANSI B16.18; wrought copper fittings, ANSI B16.22; lead-free(less than 0.2%) solder, ASTM B32; flux ASTM B813; or cast copper flared pressure fittings, ANSI B16.26.
- 2. PEXa tubing approved for potable water piping: Crosslinked Polyethylene, ASTM F876 & ASTM F877. Fittings: Insert type fittings with cold flaring memory type fittings equal to Uponor. Crimp or compression ring fittings will not be allowed.

2.02 DRAIN, WASTE AND VENT PIPE SCHEDULE

A. Interior Above Ground:

- 1. Cast iron soil pipe and fittings, hub and spigot, service weight, ASTM A74; with gasketed neoprene joints.
- 2. Hubless cast iron soil pipe and fittings, CISPI 301; with no-hub couplings, CISPI 310.
- 3. PVC plastic pipe, Schedule 40, Class 12454-B(PVC 112), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.
- 4. Galvanized steel vent pipe, Schedule 40, zinc-coated, ASTM 120 or 53 Grade B; malleable iron threaded fittings, zinc-coated.

5. Type "DWV" copper water tube, H(hard drawn) temper, ASTM B88; with cast copper drainage fittings(DWV), ANSI B16.23; wrought copper drainage fittings(DWV) , ANSI B16.29; lead-free(less than 0.2%) solder, ASTM B32; flux, ASTM B813.

B. Interior Below Ground:

1. Cast iron soil pipe and fittings, hub and spigot, service weight, ASTM A74; with gasketed neoprene joints.
2. PVC plastic pipe, Schedule 40, Class 12454-B(PVC 112), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

2.03 NATURAL GAS PIPING

A. Above Ground:

1. Type 'L' copper water tube, H(hard drawn) temper, ASTM B88; with cast copper fittings, ANSI B16.18; wrought copper fittings, ANSI B16.22; lead-free(less than 0.2%) solder, ASTM B32; flux ASTM B813.
2. Black steel pipe, Schedule 40, Type F, Grade A, ASTM A53; with black malleable iron threaded fittings, Class 150, ASTM A197/ANSI B16.3; Seamless carbon steel weld fittings, standard weight ASTM A234 grade WPB/ANSI B16.9.

B. Gas valves:

1. 2" and smaller: Ball valve, bronze-body, threaded ends, stainless steel ball, full or conventional port, teflon seat, blowout-proof stem, two-piece construction suitable for 150 psig working pressure, U.L. listed for use as a natural gas shut-off valve.
2. Gas Pressure Regulators: UL listed bronze-body, threaded ends, ventless relief. Maxitrol series.

2.04 VALVES

A. Approved Manufacturers:

1. Conbraco Apollo;
2. Milwaukee;
3. Watts;
4. Nibco.

B. Check valves:

1. 2" and smaller: Bronze, screwed, Y-pattern, 200# WOG, swing check type.

C. Ball valves:

1. 2" and smaller: Two or Three piece, bronze-body, chrome-plated bronze ball, Teflon seat and packing, 400 pig WOG, with stem extensions on insulated piping. Appollo 70-200 series.

2.05 VENT FLASHING

- A. Where pipes of this Section pass through the roof, flash the opening with seamless 3 lb./sq.ft. lead flashing with 15" x 17" minimum base size, steel reinforced boot and cast iron counterflashing sleeve.

B. *Approved Manufacturers:* SSMC, Oatey or approved equal.

2.06 PIPE HANGERS

A. Piping:

1. Split ring hangers with supporting rods.
2. Adjustable clevis.

B. Multiple or Trapeze Hangers:

1. Steel channels with welded spacers and hanger rods.

C. Floor Support:

1. Painted steel pipe saddle, stand and bolted floor flange.

D. Copper Pipe Supports:

1. All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper-plated or polyvinylchloride(PVC)-coated.
2. Where steel strut supports are used, provide isolation collar between supports/clamp and copper piping.

E. *Approved Manufacturers:* Fee and Mason, B-line, Grinnell or approved equal.

2.07 CLEANOUTS

A. Exterior: Smith #4253 with XH cast iron top in concrete areas.

B. Interior Floors: Smith 4930-PB square nickel-bronze top.

C. Finished walls: Smith #4532 stainless steel with access plate and screw.

D. Provide cleanout plugs of extra heavy bronze

E. *Approved Manufacturers:* Josam, Smith, Wade, Zurn or approved equal.

2.08 ACCESS

A. General: All piping, conduit and accessories shall be installed to permit access to equipment for maintenance. Any relocation of piping, equipment or accessories required to provide maintenance access shall be accomplished by the Contractor at no additional cost.

B. Removable Access Plates: Where only hand access is sufficient for valve access, provide removable plate-type access unit of minimum size which will facilitate required access.

1. Provide units of type, style, design, material and finish appropriate for location and exposure in each instance.
2. In exposed surfaces of occupied spaces provide round plate units, flush floor units and frameless low-profile wall units, primed-for-paint in painted surfaces and polished chrome or stainless steel finish in other surfaces.

C. Walls:

1. Smith #4767 flush wall stainless steel cover plate with screw latch lock in finished tile walls at wet locations.
2. Smith #4760 or #4765 with bonderized prime-coated steel face and screw latch lock in walls of other finished rooms.

D. Ceilings:

1. Provide Smith #4765 flush ceiling bonderized prime-coated steel face with screw latch lock.

E. Floors:

1. Smith #4910 with aluminum or nickel-bronze non-skid top.

2.09 WATER HAMMER ARRESTORS

- A. Provide Smith #5000 series or equal, stainless steel or air chambers at each fixture group utilizing a flush valve or fast closing solenoid valve, as sized and recommended by the manufacturer.
- B. *Approved Manufacturers:* Josam, PPP, Smith, Wade, Zurn or approved equal.

2.10 HANDICAPPED INSULATION

- A. Where shown on the Drawings or required by governmental agencies having jurisdiction, provide "Truebro" insulation system or approved equal on exposed hot and cold water supply piping, waste tailpiece and trap at lavatories requiring ADA compliance.

2.11 PIPE INSULATION

- A. General: Provide composite piping insulation (insulation, jackets, coverings, sealers, mastics, and adhesives) with ratings not exceeding flame spread of 25 and a smoke developed of 50 in active return air plenums. Ratings in all other areas shall not exceed a flame spread of 25 and a smoke developed of 150 (test method ASTM E-84). Comply with all codes regarding the use of foam insulation.
- B. Insulate piping located in interior space, including (but not necessarily limited to) the following services:
 1. Interior cold and hot domestic water piping.
- C. Insulate each piping system with one of the following types and thickness of insulation, except as otherwise indicated (Installer's option where more than one type is indicated).
 1. Fibrous Glass: Minimum density 3 lb./cu.ft., thermal conductivity of not more than 0.23 at 75 degrees F mean temperature, suitable for temperatures to 450 degrees F. Kraft-reinforced, foil-vapor barrier, laminate all-service jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of 0.02 perms and minimum beach puncture resistance of 50 units.
 2. Elastomeric Insulation: Closed-cell type, with minimum nominal density of 5.5 lbs./cu.ft., thermal conductivity shall be not more than 0.27 at 75 degrees F mean temperature, and maximum water vapor transmission of 0.17 perm/inch. The material shall be suitable for a temperature range from 220 degrees F to minus 40 degrees F.

D. Insulation Installation Schedule:

	<u>Service</u>	<u>Pipe Size</u>	<u>Insulation Thickness</u>
1.	Hot Water Piping	Less than 1"	1"
		1-1/4 thru 4"	1"
2.	Cold Water Piping	Less than 1"	1/2"
		1-1/4" thru 4"	1"

2.12 FIXTURES AND EQUIPMENT

- A. General: Provide plumbing fixture, trim, and equipment as shown on the "*Fixture and Equipment Schedule*" on the Contract Drawings, and as specified herein.
- B. All vitreous chinaware and porcelain fixtures shall be select quality.
1. All wastes and supplies for fixtures, except as otherwise specified or required, shall turn back into walls.
- C. All trim, except as otherwise specified, shall be constructed of brass. Finish shall be polished chrome, except where concealed (inside cabinets, etc.).
- D. Faucets shall have replaceable control assemblies or replaceable washers and seats.
- E. Exposed waste fittings shall be constructed of 17 gauge tubular brass. Slip joints are permitted only on the fixture side of the trap.
- F. All fixtures with non-accessible traps such as bathtubs, showers, floor drains, shall have a completely removable stopper or grate in order to be accessible for cleanout.
- G. Stops are to be provided at each fixture. It is the Contractor's option to install straight or angle type. All stops shall have a minimum of 1/2" inlets with flexible riser and loose key handles where exposed to the public.
1. All loose stops shall be from the same manufacturer.
- H. Hair Interceptor Trap: Smith #8750T or approved equal with stainless steel basket and removable bottom plug
- I. Approved manufacturer's for Vitreous China and enameled Cast Iron Fixtures:
1. American Standard;
2. Crane;
3. Eljer;
4. Kohler.
- J. Approved manufacturer's for Stainless Steel Sinks:
1. American Standard;
2. Dayton/Just;
3. Elkay;
4. Kohler.
- K. Approved manufacturers for Water Closet Seats:

1. Bemis;
2. Church;
3. Kohler;
4. Olsonite.

L. Approved manufacturers for Sink and Lavatory Fittings:

1. American Standard;
2. Chicago faucet;
3. Delta;
4. T&B Brass;
5. Symmons;
6. Speakman.

M. Approved manufacturers for Supplies, Stops and Traps:

1. McGuire Mfg. Co.;
2. Brass Craft;
3. Chicago Faucet;
4. Kohler.

2.13 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SITE UTILITIES

- A. Provided by others.

3.03 PLUMBING SYSTEM LAYOUT

- A. Lay out the plumbing system in careful coordination with the Drawings, determining proper elevations for all components of the system and using only the minimum number of bends to produce a satisfactorily functioning system.
- B. Follow the general layout shown on the Drawings in all cases except where other work may interfere.
- C. Lay out pipes to fall within partition, wall, or roof cavities, and to not require furring other than as shown on the Drawings.
- D. Where work is to connect to existing, Plumbing contractor must field verify all connection points before beginning any rough-in work. Verify all connecting invert elevations and flow lines of new work connected to existing gravity drainage.

3.04 TRENCHING AND BACKFILLING

- A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of Division 2 of these Specifications.
- B. Cut bottom of trenches to grade. Make trenches 12" wider than the greatest dimension of the pipe.
- C. Bedding and backfilling:
 - 1. Install piping promptly after trenching. Keep trenches open as short a time as practicable.
 - 2. Under the building, install pipes on a 6" bed of damp sand. Backfill to bottom of slab with damp sand.
 - 3. Outside the building, install underground piping on a 6" bed of damp sand. Backfill to within 12" of finish grade with damp sand. Backfill remainder with native topsoil.
 - 4. Do not backfill until installation has been approved and until Project Record Documents have been properly annotated.

3.05 INSTALLATION OF PIPING AND EQUIPMENT, GENERAL

A. General:

- 1. Proceed as rapidly as the building construction will permit.
- 2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.
- 3. Cut pipe accurately, and work into place without springing or forcing properly clearing window, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.
- 4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
- 5. Make changes in directions with fittings; make changes in main sizes with eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side of eccentric fittings at top of the pipe.
- 6. Run horizontal sanitary piping at a uniform grade of 1/4" per ft., unless otherwise noted. Run horizontal water piping with an adequate pitch upwards in direction of flow to allow complete drainage.
- 7. Provide sufficient swing joint, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.
- 8. Support piping independently at pumps, coils, tanks, and similar locations, so that weight of pipe will not be supported by the equipment.
- 9. Pipe the drains from pump glands, drip pans, relief valves, air vents, and similar locations, to spill an open sight drain, floor drain, or other acceptable discharge point, and terminate with a plain and unthreaded pipe 6" above the drain.
- 10. Securely bolt all equipment, isolators, hangers, and similar items in place.
- 11. Support each item independently from other pipes. Do not use wire for hanging or strapping pipes.
- 12. Provide complete dielectric isolation between ferrous and non-ferrous metals.
- 13. Provide union and shut off valves suitably located to facilitate maintenance and removal of equipment and apparatus.

B. Equipment access:

- 1. Install piping, equipment, and accessories to permit access for maintenance. Relocate items as necessary to provide such access, and without additional cost to the Owner.

2. Provide access doors where valves, motors, or equipment requiring access for maintenance are located in wall or chases or above ceilings. Coordinate location of access doors with other trades as required.

3.06 PIPE JOINTS

A. Copper tubing:

1. Cut square, remove burrs, and clean inside of female fitting to a bright finish.
 - a. Apply solder flux with brush to tubing.
 - b. Remove internal parts of solder-end valves prior to soldering.
2. Provide dielectric unions at points of connection of copper tubing to ferrous piping and equipment.
3. For joining copper tubing, use the following:
 - a. Water piping 3" and smaller: 95-5 solder;
 - b. Water piping larger than 3": "Sil-fos" brazing;
 - c. Underground: "Sil-fos" brazing.

B. Screwed piping:

1. Deburr cuts.
 - a. Do not ream exceeding internal diameter of the pipe.
 - b. Thread to requirements of ANSI B2.1.
2. Use Teflon tape on male thread prior to joining other services.
3. Use litharge and glycerin on joint prior to cleaning for air and oil piping.

C. Leaky joints:

1. Remake with new material.
2. Remove leaking section and/or fitting as directed.
3. Do not use thread cement or sealant to tighten joint.

3.07 PIPE SUPPORTS

A. Support suspended piping with clevis or trapeze hangers and rods.

B. Space hangers and support for horizontal steel pipes according to the following schedule:

<u>Pipe size:</u>	<u>Maximum spacing on centers:</u>
1-1/4" and smaller:	8'-0"
1-1/2" to 3":	10'-0"
4" to 5":	14'-0"

C. Space hangers and supports for horizontal copper tubing according to the following schedule:

<u>Tube size:</u>	<u>Maximum spacing on centers:</u>
1" and smaller:	6'-0"
1-1/2":	7'-0"
2":	8'-0"
2-1/2":	9'-0"
3" and larger:	10'-0"

D. Provide sway bracing on hangers longer than 18".

- E. Support vertical piping with riser clamps secured to the piping and resting on the building structure. Provide at each floor unless otherwise noted.
- F. Provide insulation continuous through hangers and rollers. Protect insulation by galvanized steel shields.
- G. Arrange pipe supports to prevent excessive deflection, and to avoid excessive bending stress.
- H. Hubless piping:
 - 1. Provide hangers on the piping at each side of, and within 6" of, hubless pipe coupling so the coupling will bear no weight.
 - 2. Do not provide hangers on couplings.
 - 3. Provide hangers adequate to maintain alignment and to prevent sagging of the pipe.
 - 4. Make adequate provision to prevent shearing and twisting of the pipe and the joint.

3.08 SLEEVES AND OPENINGS

- A. Provide sleeves for each pipe passing through walls, partitions, floors, roofs, and ceilings.
 - 1. Set pipe sleeves in place before concrete is placed.
 - 2. For uninsulated pipe, provide sleeves two pipe sizes larger than the pipe passing through, or provide a minimum of 1/2" clearance between inside and outside of the pipe.
 - 3. For insulated pipe, provide sleeves of adequate size to accommodate the full thickness of pipe covering, with clearance for packing and caulking.
- B. Caulk the space between sleeve and pipe or pipe covering, using a noncombustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finished appearance, or pack with noncombustible asbestos cotton, or fiberglass to within 1/2" of both wall faces, and provide the waterproof compound described above.
- C. Finish and escutcheons:
 - 1. Smooth up rough edges around sleeves with plaster or spackling compound.
 - 2. Provide 1" wide chrome or nickel plated escutcheons on all pipes exposed to view where passing through walls, floors, partitions, ceilings, and similar locations.
 - a. Size the escutcheons to fit pipe and covering.
 - b. Hold escutcheons in place with set screw.

3.09 CLEANOUTS

- A. Secure the Architect's approval of locations for cleanouts in finished areas prior to installation.
- B. Provide cleanouts of same nominal size as the pipes they serve; except where cleanouts are required in pipes 4" and larger provide 4" cleanouts.
- C. Make cleanouts accessible. After pressure tests are made and approved, thoroughly graphite the cleanout threads.

3.10 VALVES

- A. Provide valves in water and gas systems. Locate and arrange so as to give complete regulation of apparatus, equipment, and fixtures.

B. Provide valves in at least the following locations:

1. In branches and/or headers of water piping serving a group of fixtures.
2. On both sides of apparatus and equipment.
3. For shutoff of risers and branch mains.
4. For flushing and sterilizing the system.
5. Where shown on the Drawings.

C. Locate valves for easy accessibility and maintenance.

3.11 WATER HAMMER ARRESTORS

A. Provide water hammer arrestors on hot water lines and cold water lines.

1. Install in upright position at all quick closing valves, isolated plumbing fixtures, and supply headers at plumbing fixture groups.
2. Locate and size as specified, locate in accordance with Plumbing and Drainage Institute Standard WH-201.
3. Install water hammer arrestors behind access panels.

3.12 BACKFLOW PREVENTION

A. Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connection, against possible back siphonage.

B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

3.13 PLUMBING FIXTURE INSTALLATION

A. Installation:

1. Set fixtures level and in proper alignment with respect to walls and floors, and with fixtures equally spaced.
2. Provide supplies in proper alignment with fixtures and with each other.

B. Grout wall and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.

C. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

3.14 DISINFECTION OF WATER SYSTEMS

A. Disinfect hot and cold water systems.

1. Perform disinfection under the Architect's observation. Notify the Architect at least 48 hours prior to start of the disinfection process.
2. Upon completion of disinfecting, secure and submit the Certificate of Performance, stating system capacity, disinfectant used, time and rate of disinfectant applied, and resultant residuals in ppm at completion.
3. Use disinfectant method approved by the Architect.

B. When disinfection operation is completed, and after final flushing, secure an analysis by a laboratory approved by the Architect, based on water samples from the system, showing test negative for coli-

aerogene organisms. Provide a total plate count of less than 100 bacteria per cc, or equal to the control sample.

- C. If analysis results are not satisfactory, repeat the disinfection procedures and retest until specified standards are achieved.

3.15 OTHER TESTING AND ADJUSTING

- A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required by governmental agencies having jurisdiction.
- B. Pressure test water, gas and drain-waste-vent system for 24 hours at proper pressure standards for acceptance prior to activating system.
- C. Where test show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- D. Adjust the system to optimum standards of operation.

END OF SECTION

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SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide heating, ventilating, and air conditioning systems where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Gas-fired, sealed-combustion furnace units, direct-expansion cooling coil sections, operating and safety controls, blowers, motors, compressors, filters, refrigeration piping and related items;
2. Air-cooled condensing units;
3. Energy recovery units, filters, blowers, motors, desiccant wheel, operating and safety controls and related items;
4. Supply, return and fresh air ductwork system with grilles, diffusers, registers, and ductwork accessories;
5. Exhaust systems including dampers, grilles, registers, louvers, controls, and related items;
6. Sealed combustion boilers, pumps and hydronic specialties;
7. Radiant floor system;
8. Temperature control systems including low-voltage wiring, relays, timeclocks, thermostats, control dampers and damper operators, and related items;
9. Acoustical and thermal insulation of ductwork and related equipment;
10. Test, adjust, and balance air systems;
11. O&M manuals, warranty work and Owner instructions.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Equipment structural supports, insulated curbs etc.
3. Condensate piping from condensate pans and collection legs to open site drains.
4. Final gas connections to HVAC equipment.
6. Gas piping by HVAC Contractor.
7. Roofing, exterior wall and related exterior opens shall be caulked, sealed and patched by the HVAC Contractor.
8. Cutting and patching openings for HVAC work in existing walls, floors, roof, ceiling, etc., will be provided by the HVAC Contractor.
9. Radiant floor insulation by General Contractor.

C. Work of Other Sections:

1. Openings for ventilating work in new walls, floors, roof, ceiling, etc., will be provided by General Contractor. Location and size of these openings will be the responsibility of the HVAC Contractor.
2. Equipment support curbs furnished by the HVAC Contractor, installed by the General Contractor.
3. Lintels and structural supports for HVAC openings and equipment by the General Contractor.
4. Electrical line voltage wiring (110 volts and greater). The HVAC Contractor will furnish wiring diagrams to Electrical Contractor.

5. Motor starters not provided integral with HVAC equipment shall be provided by the Electrical Contractor.
6. Floor drains and open site drains by Plumbing Contractor.
7. Painting HVAC equipment will be the responsibility of General Contractor.

1.02 GENERAL PROVISIONS

- A. Everything essential for the completion of the work implied to be covered by these Specifications to make the system ready for normal and proper operation must be furnished and installed by this Contractor. Accordingly, any omission from either the plans or the Specifications, or both, of details necessary for the proper installation and operation of the system shall not relieve this Contractor from furnishing such detail in full and proper manner.
- B. The plans show various details indicating the general arrangement of the heating and ventilating work, sizes and locations of pipe work, ducts, units, etc., the said plans with figures, lettering, etc., shall be considered a part of these Specifications and no charge or alternation shall be made in either case unless ordered by the Engineer.
- C. In addition to the heating and ventilating plans, see General Plans of the building, as all heating and ventilating work appearing on the latter plans will be part of this Contract unless especially specified to be done by other contractors, as well as, the said work detailed on the heating and ventilating plans.

1.03 QUALITY ASSURANCE

A. Qualifications of Installers:

1. For the actual fabrication, installation and testing of heating and ventilating work, use only thoroughly trained and experienced workmen completely familiar with the items required and manufacturer's current recommended methods of installation.
2. In acceptance or rejection of installed work, the Architect or Engineer shall make no allowance for lack of skill on the part of the Workmen.

B. Reference Standards: The following standards are imposed, as applicable to work in each instances:

AABC	Associated Air Balance Council
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
MCA	Mechanical Contractors Association
MSS	Manufacturers Standardized Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association

C. Environmental design conditions for all occupied areas are as follows:

Inside:	70 deg. F	74 deg. F/64 deg. wbF
Outside:	-15 deg. F	91 deg. dbF/74 deg. wbF

1.04 CODES AND PERMITS

- A. This Contractor must comply with building laws and other ordinances in force where the building is located as far as same apply to his work.
 - 1. IBC 2009.
 - 2. IMC 2009; SPS 64.
 - 3. IECC 2009; SPS 63.
- B. He must secure permits from proper offices and pay legal fees as may be necessary for fulfilling the requirements of these Specifications.
- C. One (1) copy of all permits must be furnished to the Owner.

1.05 COORDINATION

- A. Cooperate and coordinate with other trades to assure that all systems in the heating and ventilating work may be installed in the best arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.
- B. Arrange heating and ventilating work in neat, well organized manner with piping and similar services running parallel with primary lines of building construction, and with minimum of 8 foot overhead clearance where possible.
- C. Locate operating and control equipment properly to provide easy access, and arrange entire heating and ventilating work with adequate access for operation and maintenance.
- D. Give right-of-way to piping which must slope for drainage.

1.06 ELECTRICAL PROVISIONS OF HVAC WORK

- A. Line Voltage Wiring: The Electrical Contractor is to make all line voltage (100 volts and greater) electrical wiring connections for hookup of the units and systems.
- B. Control Wiring: Exposed low voltage (less than 100 volts) temperature control wiring in connection with heating and ventilating system shall be in EMT conduit by the Heating Contractor in strict accordance with the applicable sections of the Electrical Specifications. *Concealed control wiring* may be routed to equipment without conduit, unless subject to physical damage.
- C. This Contractor shall consult with the Electrical Contractor before ordering electrical motors, to ascertain correct electrical current characteristics. HVAC Contractor shall furnish complete list and location of equipment requiring electrical connections and necessary wiring diagrams to Electrical Contractor.
- D. Motors: Where not otherwise indicated, comply with applicable provisions of the National Electrical Code, NEMA Standards, and sections of Division 16 of Specifications.
 - 1. Phases and Current: 1/6 HP and smaller is Contractor's option; up to 1/3 HP, capacitor-start, 120 volt, 60 cycle single-phase; 1/2 HP and larger, squirrel-cage induction NEMA rated 200 volt, three-phase, 60 cycle. Provide two (2) separate windings on 2 speed three-phase motors. Coordinate with actual current characteristics; refer to Division 16 of Specifications.
 - 2. High Efficiency Motors: All motors 1 HP and larger shall be high efficiency motors meeting or exceeding values tested in accordance with IEEE Standards 112, Method B procedures as stated in NEMA MG 1-12.53a.
 - 3. Service Factor: 1.15 for three-phase; 1.35 for single-phase.
 - 4. Construction: General purpose, continuous duty.

5. Frames: NEMA Standard for horsepower specified.
 6. Overload Protection: Built-in thermal, with internal sensing device for stopping motor, and for signaling where indicated.
- E. Starter and Switches: Where motor starters and switches are indicated to be an integral part of equipment furnished by Heating installer, they shall meet requirements of Division 16 and shall be connected by the Electrical installer.
- F. Wiring Connections: Wired connections in flexible conduit, except where plug-in electrical cords are indicated and permitted by governing regulations.
- G. General Wiring: Comply with applicable provisions of Division 16 Section.

1.07 PAINTING HVAC WORK

- A. General: All field painting of mechanical equipment will be done by the General Contractor unless equipment is specified otherwise or is to be furnished with factory-applied finish coats.
- B. All equipment shall be provided with factory-applied prime finish, unless otherwise specified.
- C. If the factory shop paint finish on any equipment furnished by the Contractor is damaged in shipment or during construction of the building, the equipment shall be refinished by the Contractor to the satisfaction of the Architect/Engineer.
- D. Prime paint all field-fabricated metal work under HVAC work, comply with applicable provisions of Division 9.

1.08 IDENTIFICATION

- A. General: Provide adequate marking of the HVAC system and control equipment to allow identification and coordination of maintenance activities and maintenance manuals. Tag and label HVAC equipment located in exposed or accessible areas to conform to ANSI A13.1-1981. After painting and/or covering is complete, identify all equipment, piping and ductwork by its abbreviated generic name as shown/scheduled/specified.
- B. Equipment: Identify all major HVAC equipment with plastic-laminate signs of 2" high painted stencils and contrasting background. Provide test of sufficient clarity and lettering to convey adequate information at each location and mount permanently. Identify control equipment by 1-1/2" x 4" plastic laminate nameplates with 1/4" high lettering.
- C. Piping and Ductwork: Identify all exposed and accessible piping and ductwork once every 30 feet at each branch, at termination of lines, and near valve or equipment connections. Place flow directional arrows at each piping or duct identification label. Provide appropriate sized letters to convey information on wrap-around siphonage, adhesive-backed or paint stenciled labels.
 1. Exposed includes all piping and ductwork above suspended ceiling systems.
- D. Valves: Identify all valves with 1-1/2" diameter minimum polished brass stamp-engraved or plastic laminate tags. Prefix or color-code tags for each generic piping service. Prepare and submit valve tag schedule, service and tag description, incorporate in Instruction/O&M Manual.
- E. Operational Labels: Where needed for proper or adequate information on operation and maintenance of HVAC systems, provide labels or markers of plasticized or laminated card stock, typewritten of appropriate size to convey the information.

F. Submit schedule of Identification labels for Architect/Engineer approval.

1.09 CUTTING AND PATCHING

A. General: Refer to Division 1 General Requirements.

B. Perform all cutting and patching required for complete installation of the HVAC systems, unless specifically noted otherwise. Provide all materials required for patching unless otherwise noted.

1. All cutting and patching necessary of structural members to install any HVAC work shall not be done without permission, and then only carefully done under the direction of the Architect and General Contractor.

C. The Contractor shall not endanger any work of other trades by any demolition, cutting, digging or otherwise. Any cost caused by defective or ill-timed cutting and patching work shall be borne by the contractor responsible. Each contractor requiring cutting and patching shall hire men skilled in such cutting and patching to do the work.

1. All patching work in existing areas shall match existing work and restore the finish to its original condition in material, quality, texture, finish and color unless specifically noted or scheduled otherwise.

1.10 CONCRETE FOR HVAC WORK

A. General: Comply with pertinent provisions of Division 1 and Division 3.

B. All concrete work for equipment pads by the HVAC Contractor

C. Concrete Equipment Pads: For each piece of floor or ground mounted HVAC equipment as indicated on the Drawings, provide a 4" concrete housekeeping pad at a minimum of 4 inches wider than the full size of the respective equipment's base. Equipment pads are required for the following equipment:

1. Furnace units;
2. Energy recovery units;
3. Air-cooled condensing units.

1.11 EQUIPMENT ACCESS

A. General: All valves, volume dampers, equipment and accessories shall be installed to permit access to equipment for maintenance, servicing or repairs. Relocation of piping, ducts or equipment to accomplish equipment access shall be completed by this Contractor at no additional cost.

B. Location: Provide access doors where equipment is located in chases or inaccessible locations. Access panels shall be furnished by this Contractor and installed by the specific trade responsible for the material in which the access panels are installed.

C. Construction: Access doors in fire-rated construction must have UL label. Access doors shall be of size to provide adequate access to equipment concealed in wall, ceiling and or furred-in spaces. Milcor or approved equal; 14 gauge steel frame and door, prime-coated, except stainless steel in areas subject to excessive moisture.

1.12 EQUIPMENT SUPPORTS

- A. General: Provide all supporting steel and related materials not indicated on structural drawings as required for the installation of equipment and materials, including angles, channels, beams and hangers.
 - 1. Prime coat paint all supports.
 - 2. Turn over equipment curbs to the General Contractor for installation; structural steel supports under equipment curbs by the General Contractor.

1.13 EQUIPMENT GUARDS

- A. General: Provide equipment guard over belt-driven assemblies, pump shafts, exposed fans and elsewhere, as indicated in this specification or required by code.
 - 1. Prime coat paint all supports.

1.14 GUARANTEE

- A. All material and workmanship must be new and first class in every respect; the heating, ventilating and air conditioning equipment must be turned over to the owner in complete working order and free from mechanical defects.
- B. The HVAC Contractor must guarantee all labor and materials for one (1) year from the substantial completion and acceptance of the HVAC system and keep or place same in repair for said period, unless such defects are clearly the result of bad management after HVAC system was turned over to the Owner.
- C. The system must be guaranteed to operate noiselessly and to the satisfaction of the Owner and to supply and exhaust quantities of air shown on the Drawings.
- D. Before final acceptance of this work, the Contractor shall have the entire apparatus and system in complete and satisfactory operation and shall maintain same in satisfactory and continuous operation for a period of ten days prior to the date of acceptance; fuel to be furnished by the Owner.
- E. The HVAC Contractor shall submit to the Engineer in triplicate, at the completion of his work, a certified statement, signed by a principal of the firm, stating that the system has been fully installed and is operating within the intent of the plans and specifications and that all system components have been tested and adjusted. This statement shall be submitted before the system is presented to the Owner for final inspection.

1.15 SUBMITTALS

- A. Refer to Division 1 for additional submittal requirements.
- B. The HVAC Contractor will be held responsible for correction of work deemed necessary by the Engineer due to proceeding with the work without shop drawings that have the Engineer's final approval.
- C. Shop drawings shall include data on physical dimensions, gauges, materials of construction and capacities.
 - 1. Incomplete drawings will be disapproved.
- D. This Contractor will be responsible for all figures and dimensions shown on the shop drawings. Approval of shop drawings describing equipment that cannot fit in the space allotted does not relieve this Contractor from providing equipment that will meet the space requirements.

- E. Submit electronic copies of shop drawings to the Architect/Engineer for approval with proper file identification, with complete detail for all equipment, materials, etc., to be furnished and installed for this project as follows:
1. Furnace units;
 2. Condensing units and direct-expansion coils;
 3. Energy recovery equipment;
 4. Diffusers, grilles, registers and louvers;
 5. Hot water boilers, pumps and hydronic specialties;
 6. Radiant floor system;
 7. Insulation systems;
 8. Temperature controls and wiring diagrams;
 9. TAB air balance report;
 10. Instructions and O&M manuals;
 11. As-built drawings.
- F. Submit complete temperature control wiring diagrams and description of components and their operation, prior to installing temperature control system.
- G. Marked-up drawings indicated record installation as-built HVAC work.
- H. Submit to the local building authority for approval: equipment cuts, O&M manuals, Installation manuals, and any UL listed assemblies employed to penetrate fire-rated assemblies.

1.16 HOUSEKEEPING AND CLEANUP

- A. Periodically as work progress and/or as directed by the Architect, the Contractor shall remove waste materials from the building and leave the area of the workroom clean. Upon completion of work remove all tools, scaffolding, broken and waste materials, etc., from the site.

1.17 LUBRICATION

- A. Upon completion of the work and before turning over to the Owner, clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacturer.
1. The Contractor is responsible for maintaining and lubrication of all mechanical equipment under his contract until the Owner accepts the work.

1.18 INSTRUCTIONS AND MANUALS

- A. Upon completion of the installation, but before final acceptance of the system, this Contractor shall instruct the Owner on the care and operation of all parts of the system.
- B. Assemble two (2) complete sets of manufacturer's printed operating and maintenance instructions for all HVAC equipment and installed under this contract. Prepare in bound copies complete with index tabs. Information must include parts lists, equipment warranties, and wiring diagrams. Submit bound copies to the Architect for distribution.

1.19 AS-BUILT DRAWINGS

- A. During construction maintain a set of prints showing installed as-built work for the project.

- B. Upon completion of construction before final acceptance, provide a set of as-built drawings to the Architect/Engineer.

PART 2 - PRODUCTS

2.01 HEATING HOT WATER SYSTEM

A. 2" and smaller:

1. ASTM B88 seamless, Type L, hard temper copper tube with wrought copper 95-5 solder-joint fittings.

2.02 MAKE-UP WATER

- A. ASTM B88 seamless, Type L, hard temper copper tube with wrought copper 95-5 solder-joint fittings.

2.03 CONDENSATE AND DRAINAGE

- A. Schedule 40 PVC socket welded fittings.

2.04 PIPELINE STRAINERS

- A. Strainers 3" and smaller: Full pipeline size, "Y" type, 400 psi (WOG) 250 psi(s), bronze body, with screwed ends. Furnish strainers with a removable plug type screen retainer unless otherwise indicated on the drawings.
- B. Liquid Service: Screens to be brass or stainless steel with 1/32" diameter perforation for sizes through 2" and 1/16" diameter perforation for sizes over 2" for closed piping systems and 1/8" diameter perforation for open piping systems. Maximum pressure drop to be 4 feet W.G. in clean strainer.

2.05 VALVES

- A. General: Select valves of the best quality and type suited for the specific service and piping system used.
- B. Water Systems Valves:
1. Check Valves: 2-1/2" and smaller shall be bronze body, renewable Teflon disc, threaded, 125 S - 200 WOG rated, Nibco T-413-Y.
 2. Ball Valves: 2-1/2" and smaller shall be bronze body, threaded, 316 stainless steel ball and stem, full port, Teflon seat rings, two-piece construction, 400 WOG, Apollo 70 - 100 series.
 3. Drain Valves: 1/2" threaded or sweat end, bronze body, Teflon seat, full port, 125 S - 200 WOG rated, Nibco #64.
 4. Gauge Valves: 1/4" brass needle valve, threaded ends, Terice Fig 735.

2.06 BALANCING VALVES

A. Calibrated Balancing Valves:

1. 3" and smaller: Cast iron or bronze body disc calibrated balance valve with readout valves fitted with integral check valves to prevent loss of fluid when attaching monitoring kit.

Integral pointer indicating degree of valve opening. Internal seals constructed for 125 PSIG working pressure.

2.07 WATER PRESSURE REDUCING VALVES

- A. Valves shall be diaphragm operated and pressure adjustable with anti-siphon check valve and inlet strainer designed for a maximum working pressure of 125 PSIG, set at 12 PSIG with 8 to 25 PSIG adjustment.

2.08 WATER RELIEF VALVES

- A. Valves shall be iron or bronze body, diaphragm operated, with non-ferrous seat and designed for a maximum working pressure of 125 PSIG.
- B. Relief valves shall conform to State requirements and each valve shall have an ASME stamp.

2.09 AIR SEPARATORS

- A. Manufacturers: Spirotherm, Bell and Gossett or approved equal.
- B. 2" and smaller: Micro bubble removal system constructed of cast iron or welded steel construction, flanged and/or threaded connections, perforated stainless steel air collector tube to direct air toward the air elimination connection at the top of the unit, tangential water inlet and outlet connections, bottom blow down connection, constructed in accordance with ASME boiler and pressure vessel code and stamped for 125 PSIG design pressure.
- C. Unless indicated otherwise, provide each unit with a removable stainless steel system strainer with 3/16" diameter perforations and a free area not less than five times the cross sectional area of the connecting pipe.

2.10 AIR VENTS

- A. Manual air vents for components and pipe, Dole No. 9, Bell & Gossett Model 4V or other approved product, 125 PSIG at 210 deg F. Provide air chambers with 1/4" type L soft-temper copper tubing and brass cock at accessible discharge location.
- B. Vents shall be constructed of metal for maximum operating pressure of 150 psi and maximum operating temperature of 250 deg F and all working parts shall be noncorrosive.

2.11 EXPANSION TANKS

- A. Black steel rust-proof coated, enamel finish, bladder diaphragm, air charging valve and tank inlet fittings. ASME Code construction for 125 PSIG design pressure with stamped "U" symbol.

2.12 THERMOMETERS

- A. Manufacturers: Terrice, Marsh, Taylor, Jay, Marshalltown or Weiss.
- B. Pipeline mounted thermometers shall be mercury reading, 9" scale cast aluminum case industrial thermometers with clear acrylic plastic window front and adjustable angle stem to permit easy reading from the floor or operating platform. Furnish with extended necks suitable for insulated piping as required. Thermometers shall be compatible with sockets as specified herein.

C. The range of thermometers shall be:

<u>Service</u>	<u>Scale Range</u>	<u>Increment</u>
Hot Water	40 deg F to 240 deg F	2 deg F

F. Sockets and test wells shall be brass with threaded connections suitable for thermometer bulbs and control sensing devices. Socket and test wells length shall be suitable for pipe diameter with extended necks as required to suit pipe insulation. Test wells to be similar to Terice 5550 Series.

2.13 PRESSURE GAUGES

A. Manufacturers: Terice, U.S. Gauge, Marsh, Taylor, Marshalltown.

B. All gauges shall be suitable for the pressure service intended, with minimum 4-1/2" diameter dial cast aluminum case, double strength glass window, phosphor bronze bourdon tube with bronze bushed brass movement, and recalibration from the front of the gauge dial.

1. Gauges shall meet ANSI grade A specifications.
2. Gauges by the temperature control manufacturer meeting these specifications will be acceptable.
3. Reading range of gauges shall be:

<u>Service</u>	<u>Scale Range</u>	<u>Increments</u>
Hot Water	0 PSIG to 50 PSIG	1 PSIG

2.14 PIPE HANGERS AND SUPPORTS

A. Manufacturers: Grinnell, Fee and Mason, Michigan Hanger, B-Line or Elcen similar to the Grinnell Fixtures listed.

<u>System</u>	<u>Pipe Size</u>	<u>Type Hanger</u>	<u>Trapeze Support</u>
Hot system (120 deg F & above)	2" & less	65, 260	65, 260
	2-1/2" & over	174, 181	174,175,177,181

B. Hangers for duct copper pipe support without insulation cover shall be either copper plated or PVC coated.

C. Hot system piping over 2-1/2" and all cold system piping sizes shall be supported externally to the piping insulation with insulation shields and insulation support blocks.

D. Secure pipe in place to prevent pipe vibration, maintain grading by proper adjustment and to provide for expansion and contraction.

E. Design supports of strength and rigidity to suit loading, service and in manner which will not unduly stress the building construction. Fasten supports and hangers to building steel framing wherever practicable. Do not use another pipe for support. Do not use perforated iron, chain or wire as hangers.

F. Provide pipe supports according to the following schedule:

<u>Pipe Size-Inches</u>	<u>Rod Size-Inches</u>	<u>Max. Span in Feet</u>	
		<u>Copper</u>	<u>Steel</u>
1/2" thru 2"	3/8"	6'	8'

2.15 PIPE HANGER RODS

- A. Support rods shall conform to the latest MSS standards except as modified herein.
- B. Size rods for individual hangers and trapeze support as indicated in the following schedule. Furnish rods complete with adjusting and lock nuts.
- C. Total weight of equipment, including valves, fittings, pipe, pipe content and insulation, shall not exceed the limits indicated.

<u>Maximum Load Lbs.</u>	<u>Rod Diameter</u>
610	3/8"
1130	1/2"
1810	5/8"

- D. Beam Clamps: Grinnell Fig. 86 Series beam clamps with retaining clip for hanger rods to 5/8". Grinnell Fig. 228 beam clamps for hanger rods 3/4" and above.
- E. Concrete Inserts: Grinnell Fig. 279, 281 or 282, suitable for rod diameter and weight supported. Inserts drilled and placed after concrete pour shall be steel shell with plug type, not depending on soft lead for holding power.

2.18 IN-LINE CENTRIFUGAL PUMPS

- A. General: Provide in-line pipe-mounted, single suction, centrifugal type pumps where indicated, and of capacities as scheduled.
- B. Casing: Stainless steel or cast iron bronze - fitted with a working pressure of 175 PSIG and operating temperature of 225 degrees F continuous, 250 degrees F intermittent. Provide tapped and plugged openings for vent, drain, suction and discharge gauge connections.
- C. Shaft: Stainless steel with integral thrust collar.
- D. Bearings: System lubricated.
- E. Seal: Mechanical single unbalanced type with Buna N/Carbon rotating element and ceramic, Ni-resist stationary seat or other approved product.
- F. Impeller: Single-suction enclosed type, hydraulically and dynamically balanced, and keyed to shaft, stainless steel construction.
- G. Motor: ECM type motor, non-overloading at any point on pump curve, open, drip-proof, oil-lubricated journal bearings, resilient mounted construction, built-in thermal overload protection on single phase motors.

2.19 RADIANT FLOOR SYSTEM

- A. QUALITY ASSURANCE:
 Installer Qualifications: Use an installer with demonstrated experience on projects of similar size and complexity and possessing documentation proving successful completion of radiant floor heating training by the PEX tubing manufacturer.

Certifications: Provide letters of certification as follows.

1. Installer is trained by the PEX tubing manufacturer to install the radiant floor heating system.
2. Installer uses skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed tradesperson.

Pre-installation Meetings:

1. Verify project requirements, substrate conditions, floor coverings, manufacturer's installation instructions and warranty requirements.
2. Review project construction timeline to ensure compliance or discuss modifications as required.
3. Interface with other trade representatives to verify areas of responsibility.

B. DESIGN CRITERIA:

Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

1. Construct all piping for the highest pressures and temperatures in the respective system in accordance with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.
2. Standard Grade hydrostatic pressure ratings from Plastics Pipe Institute in accordance with TR-3 as listed in TR-4. The following three standard-grade hydrostatic ratings are required.
 - 200 degrees F (93 degrees C) at 80 psi (551 kPa)
 - 180 degrees F (82 degrees C) at 100 psi (689 kPa)
 - 73.4 degrees F (23 degrees C) at 160 psi (1102 kPa)

C. Performance Requirements: Provide hydronic radiant floor heating system that is manufactured, fabricated and installed to comply with regulatory agencies and authorities with jurisdiction, and maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure.

1. Show compliance with ASTM F877.
2. Show compliance with DIN 4726 regarding oxygen diffusion concerns where applicable.
3. Show compliance with ASTM E119 and ANSI/UL 263 through certification listings with
 4. Underwriters Laboratories, Inc. (UL).

D. HYDRONIC RADIANT FLOOR TUBING:

Material: Crosslinked polyethylene (PEX) manufactured by PEX-a or Engle method

- tested
1. Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and for compliance by an independent third-party agency.
 2. Pressure Ratings: Standard Grade hydrostatic design and pressure ratings as issued by the
 3. Plastics Pipe Institute (PPI), a division of the Society of the Plastics Industry (SPI).
 4. Show compliance with ASTM E119 and ANSI/UL 263 through certification listings through UL.
 5. Minimum Bend Radius (Cold Bending): No less than six times the outside diameter. Use the PEX tubing manufacturer's bend supports if radius is less than stated.
 6. Barrier Tubing Type: Tubing with an oxygen diffusion barrier does not exceed an oxygen diffusion rate of 0.10 grams per cubic meter per day at 104 degrees F (40 degrees C) water temperature in accordance with German DIN 4726.
 7. Nominal Inside Diameter: Provide tubing with nominal inside diameter in accordance with ASTM F876, as indicated.
 8. Manufacturer: Wirsbo hePEX™ plus as design basis; approved equal will be accepted.

E. MANIFOLDS:

Manifolds: Light commercial, valved copper manifolds.

1. For system compatibility, use 1¼-inch copper type 'L' manifolds offered by the respective PEX tubing manufacturer.
2. Use manifold mounting brackets offered by the respective PEX tubing manufacturer.
3. Manifolds must provide individual flow control for each loop of the manifold through valve actuators available from the manifold supplier.

4. Manifolds must feature manual flow balancing capability within the manifold body for balancing unequal loop lengths across the manifold.
5. Manifolds support 5/16 inch to 3/4 inch PEX tubing.
6. Each manifold location should have the ability to vent air manually from the system.
7. Install valved copper manifolds primarily for wall-hung or boxed applications.
8. Use manifolds with an isolation valve or a combination isolation and balancing valve on each outlet.
9. Ensure manifold end cap offers tapping for 1/8 inch FNPT and 1/2 inch FNPT for vent and drain.
10. Install supply and return piping to the manifold in a reverse-return configuration to ensure self-balancing.
11. If the supply and return piping is in direct-return configuration, install and balance flow setters on the return leg of each manifold to the mains.

F. FITTINGS:

For system compatibility, use fittings offered by the PEX tubing manufacturer. The fitting assembly must comply with ASTM F877 and CAN/CSA B137.5 requirements.

1. Use compression fittings or pro-pex expansion fittings as applicable.
2. Compression Fittings: Fitting assembly manufactured from brass material. The fitting assembly consists of a barbed insert, a compression ring and a compression nut. The barbed insert is manufactured with an o-ring to facilitate air pressure testing.
3. Pro-pex Fittings: Fittings manufactured in accordance with ASTM F1960. Fitting assembly manufactured from material listed in paragraph 5.1 of ASTM F1960. The fitting assembly consists of a barbed adapter and an applicable sized PEX ring. The barbed insert may include o-ring to facilitate pressure testing with air.

2.20 SEALED COMBUSTION BOILER, MODULAR(CONDENSING)

- A. Manufactures: IBC or approved equal.
- B. Provide units with capacity and operating characteristics indicated on schedules.
- C. Boiler ASME stamped for 160 psig and designed per ASME section IV. Furnish a relief valve in compliance with ASME section IV, and set at 30 psig. All internal combustion chamber, and internal burner components, shall be manufactured with materials suitable to withstand constant operation under condensing conditions. Combustion chamber shall have a condensate drain to discharge any condensate buildup.
- D. Boiler efficiency 95%+ per ANSI Z21.13a, and operation in the condensing mode with inlet temperatures as low as 90 F.
- E. Combustion air intake capable of accepting either free mechanical room air, or direct outside air through a sealed intake pipe of the length and diameter shown on drawings. Provide inlet/outlet combustion vent temperature fittings with direct outside air application
- F. Category IV flue vent connection, condensing positive pressure, for both roof and sidewall venting. The vent outlet shall be compatible with PVC/CPVC plastic vent material.
- G. Baked enamel finish boiler sheet metal jacket with removal panels for maintenance access.
- H. Inlet and outlet temperature gauge to monitor inlet and outlet water temperatures.
- I. Provide a water temperature controller with integral outdoor reset with customizable reset curves, outdoor air sensor and hot water supply header sensor. Controller shall employ electronic PID

modulating control to maintain setpoint hot water header temperature. Provide auxiliary contacts for external 4-20ma or 0-10VDC BAS signal to reset of hot water supply, if selected.

- J. Provide each boiler shall be provided with a hydronic flow switch to prevent operation without proper flow.
- K. Provide each boiler with dual over temperature protection, including manual reset, in accordance with ASME Section IV and CSD-1.
- L. Boiler control panel shall be equipped with a LCD display and keypad to setup control parameter and provide diagnostic interface with operator.
- M. Provide remote fault alarm contact for flame sensor and high temperature limit failure.
- N. Provide integral primary boiler control. The primary pump shall be capable of serving the boiler's heat exchanger flow requirements with 30 feet equivalent external piping losses.
- O. Provide single point 115 volt 1-phase wiring for controls and combustion fan.
- P. Propane gas-fired burners, forced draft power type with a positive pressure at the boiler discharge. Stainless steel burner mixer. Maximum Nox emissions under 20 PPM.
- Q. Gas burner shall modulate down to 20% capacity(5:1 turndown).
- R. Furnish units with fuel trains and operating controls conforming to the latest UL or equivalent agency approval, and shall be factory assembled, wired, mounted, and factory fire tested.

2.21 WATER TREATMENT SYSTEM

- A. Recommend a periodic test procedure and chemical treatment program for each system.

Treat the following systems:

- 1. Hot Water Heating Water
- B. Provide the initial chemical treatment for all systems based on a complete system fluid analysis prior to the equipment installation. The initial chemical treatment supply of chemicals for each system shall be adequate for the start-up and testing period, for the time the systems are being operated by the Contractor for temporary heating and cooling, and for one year after start-up of the system.
 - C. MANUFACTURERS:
Dow Chemical, Betz Entac, Dearborn Div. - W. R. Grace & Co., Fremont Industries, Mitco Water Labs, Mogul Corporation, Nalco Chemical Co., Western Water Management, or approved equal.
 - D. SYSTEM CLEANER:
Blend of organic alkaline penetrants, emulsifiers, surfactants and corrosion inhibitors that remove grease and petroleum products from the interior of piping systems. Cleaners that contain trisodium phosphate are specifically not acceptable.
 - 1. Verify and confirm the system cleaner chemicals are compatible with the geothermal treatment solution.
 - E. SYSTEM INHIBITOR:
Scale and corrosion inhibitor consisting of boron nitrite, benzol thiazol, benzotriazole, mercapto-benzo-thiazole, and tolyltrizole silicates.

F. CLOSED WATER SYSTEM TREATMENT:
Sequestering agent to reduce deposits and adjust pH: polyphosphate.

1. Corrosion inhibitors: boron-nitrite, sodium nitrite and borax, sodium tolyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
Conductivity enhancers: phosphates or phosphonates.

2.22 DUCTWORK

A. Sheet Metal: Furnish, install, fit and secure in place all supply, return, exhaust and vent air ducts, risers, branches, etc., as shown and detailed on plans, built of galvanized iron as hereinafter specified.

1. Sheet metal work shall be G90 galvanized and constructed according to practices recommended in the HVAC Duct Construction Standards - Metal and Flexible 1st ED. 1985, as published by SMACNA, and hereinafter specified. All duct dimensions noted on the drawings are finished inside dimensions.
2. Ductwork Pressure-Velocity Classification: + 2" static pressure class 2,500 FPM velocity level.
3. Duct Sealing Requirements: Seal Class B. Transverse and longitudinal joints.
4. Install ducts, risers, etc., as indicated on plans, making necessary changes in cross section, offsets, etc., whether or not same is specifically indicated. If ducts cannot be run as shown on drawings, install ducts between required points, subject to the approval of Engineer without additional cost to the Owner.
5. At all outlets and inlets in rooms, flange ducts for attachment of grilles. Install grilles according to manufacturer's recommendations.
6. Sheet metal work throughout shall be assembled and erected in such a manner that no vibration will occur and no noise be transmitted by the moving air due to inappropriate fitting or offsets. *All corrective measures will be determined by the Engineer at the HVAC Contractor's expense.*
7. All duct turns shall have either an inside radius equal to the duct width or be a miter turn with turning vanes. Turning vanes shall be double wall air-foil type.
8. Branch Take-Off Fittings: Round branch take-off fittings shall be low-loss type fittings such as bellmouth or conical type; *no scoops or 90-degree tee fittings allowed*. Square/rectangular branch take-off fittings shall have 45-degree leading edge with 4-inch minimum depth; *no air turns or scoops allowed*.

B. Ductwork Accessories:

1. Volume Dampers: Furnish and install in branches of supply air and exhaust ducts. Substantial volume dampers to be fitted with locking devices for adjusting the air delivery. Damper blades shall not exceed 6" width.
2. Access Panels: Install access panels with latches and gaskets in ducts at automatic dampers, coils, fire dampers, louver plenums and other duct mounted equipment. Panels in insulated ducts must be internally insulated.
3. Openings around Ducts: Through walls must be filled with fiberglass, caulked and sealed with 14 gauge galvanized sheet metal angle around duct on each side of wall.

2.23 FLEXIBLE DUCT

A. Provide factory fabricated insulated low-pressure flexible duct with the following construction:

1. Zinc-coated spring steel helix with 1" thick fiberglass insulation sheathed in a seamless vapor barrier (RFK) jacket.

- B. Composite assembly, including insulation and vapor barrier, meeting Class 1 requirements of flame spread rating of 25 or less and smoke developed rating of 50 or less as set forth in NFPA Bulletin 90-A, and bearing the UL label as an air duct.

2.24 INSULATION

A. General:

1. Provide materials complying with NFPA Bulletin 90-A, as determined by UL method NFPA 225-ASTM E84, and complying with the governing code, with flame spread rating under 25 and smoke developed rating under 50.
2. Where vapor barriers are used, provide intact and continuous throughout.
3. Acceptable Manufacturers:
 - a. Owens/Corning Fiberglass
 - b. Manville
 - c. Certainteed
 - d. Knauf

B. Ductwork Liner:

1. Acoustic Duct Liner: Shall be equal to Shuller Manville Permacote Linacoustic mat faced fiberglass flexible duct liner (coated); Kv= 0.25 rated up to 5000 FPM velocity and 250 F temperatures.
2. Application Schedule: Line galvanized ductwork with flexible duct liner on the following ductwork systems with thicknesses indicated below:

<u>Air System</u>	<u>Thickness</u>
Transfer ducts	1"
Return air plenum at furnace unit	1"
3. Increase all lined duct dimensions to maintain the necessary free area of the duct, as shown on the plans.

C. External Ductwork Insulation:

1. Insulate ductwork on exterior with fiberglass insulation and foil-reinforced kraft jacket.
2. Concealed Ductwork: Wrap ductwork with flexible type fiberglass insulation, operating temperature range 40 to 250 degrees F, Kv = 0.25, 3/4 PCF density, FSK aluminum foil reinforced with fiberglass scrim laminated to UL rated draft, vapor permeability less than 0.02 perms. Equal to Shuller Manville Microlite faced duct wrap insulation.
3. Exposed Ductwork: Wrap ductwork with semi-rigid type fiberglass insulation, operating temperature range 40 to 250 degrees F, Kv = 0.23, 3 PCF density, FSK aluminum foil reinforced with fiberglass scrim laminated to UL rated kraft, vapor permeability less than 0.02 perms. Equal to Shuller Manville 814 series Spin-Glass fiberglass duct insulation.
4. Application Schedule:

<u>Air System</u>	<u>Thickness</u>
Exhaust Ducts – Fan MD or BD to outlet	1-1/2"
Tempered Fresh Air	1-1/2"
Tempered Exhaust Air	1-1/2"
Supply Ducts	2"

Note: No external insulation required on ductwork exposed to conditioned spaces.

2.25 VIBRATION ISOLATION

A. General:

1. Isolate all motor driven mechanical, unless otherwise noted, from the building structure and from the systems which they serve, to prevent equipment vibrations from being transmitted to the structure.
2. Consider equipment weight distribution to provide uniform deflections.
3. For equipment with variable speed capability, select vibration isolation devices based on the lowest speed.

B. Manufacturers: Products and methods of fabrication shall be as manufactured by Mason Industries, Korfund Co., Amber/Booth Co., Vibration Mounting and Controls, or Kinetics, similar to the manufacturers model listed.

C. Performance:

1. Select all vibration isolation devices to provide minimum 95% isolation efficiency or based on the minimum static deflection and mounting criteria listed below, whichever is greater.

2. Vibration Isolation Schedule:

<u>Equipment Type</u>	<u>Type of Isolation</u>	<u>Minimum Static Deflection - Inches</u>
Furnace Units	Type 'X' Flexible Duct Connector	3/4"
ERV Fans	Type 'X' Flexible Duct Connector	3/4"

D. Type X Flexible Duct Connectors:

1. Laminated flexible sheet of cotton duct and sheet elastomeric(butly, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated.
2. Form connectors with full-faced flanges and accordion bellows to perform as flexible isolation units.
3. Provide galvanized steel retaining rings for airtight connections with ductwork.

2.26 GRILLES, REGISTERS AND DIFFUSERS

A. Furnish grilles, registers and diffusers in the sizes, type and capacity as shown on the Drawings by the selected manufacturer or approved equal.

B. Square Ceiling Diffusers, Round Necks: Carnes SAFA series louvered face T-bar or surface mounted with opposed bladed damper, fixed or adjustable air pattern, and round neck collars for flex duct connections. White finish, aluminum construction.

C. Square Ceiling Diffusers Square and Rectangular Neck: Carnes SLRB and SLJB series perforated face for surface and T-bar mounting. Hinged faced with 51% free area. White finish with black interior finish, aluminum construction.

D. Square and Rectangular Wall Grilles and Registers, Square and Rectangular Neck:

1. Steel: Carnes model RTDA and RTAA series steel registers with adjustable face blades on supply and 45 degree set on return. Opposed blade damper on registers. White finish.
2. Aluminum: Carnes RWDA (3/4") and RWFA (1/2") series double deflection supply register with adjustable face blades, and RWAA and RWLA series return register with 45 degrees blade set, aluminum construction, steel dampers, where indicated. White finish.

- E. Grilles, Registers and Diffusers shall be suitable and compatible with ceiling construction in which they are installed. Check architectural schedules for ceiling construction. Coordinate locations with T-bar ceiling system and lighting fixtures.

2.27 SEALED-COMBUSTION FURNACE UNITS

- A. Direct vent, sealed combustion, condensing type AGA certified for use with propane gas. Minimum annual fuel utilization efficiency (A.F.U.E.) of 95% minimum. All ratings are to be certified by GAMA. All wiring shall comply with the National Electrical Code.
 - 1. Provide 22 gauge steel casing with baked enamel finish or pre-painted galvanized steel. Insulate casing back and side panels with foil faced fiberglass insulation.
 - 2. Construct primary heat exchanger of aluminized steel.
 - 3. Construct secondary heat exchanger of stainless steel with aluminum fins or of polypropylene laminated steel.
 - 4. Aluminized steel multi-port in-shot burner with hot surface or electronic spark ignition, approved for vertical or sidewall venting.
 - 5. Two-stage gas heating.
- B. AGA listed gas controls including manual main shut-off valve, double automatic gas valves for redundancy and gas pressure regulator.
- C. Centrifugal type blower fan statically and dynamically balanced with multiple speed, direct drive ECM fan motor. Provide low energy induced draft blower for heat exchanger prepurge and combustion gas venting.
- D. Provide unit with MERV 13 30% efficient disposable type panel air filter and external filter holding rack with hinged-gasketed cover and a maximum filter face velocity of 300 fpm.
- E. Provide solid state integral control unit with all necessary controls and relays including but not limited to:
 - 1. Pressure switch for airflow of flue products through furnace and out vent system
 - 2. Rollout switch with manual reset to prevent overtemperature in burner area
 - 3. Electronic flame sensor
 - 4. Blower access safety interlock
 - 5. Timed blower start after main burners ignite
 - 6. Factory installed 24 v transformer for controls and thermostat
 - 7. LED's to indicate status and to aid in troubleshooting
- F. Provide unit with matching cased "A" or "W" configuration cooling coil for upflow units, "V" configuration cooling coil for downflow units, and vertical flat face configuration cooling coil for horizontal units. Minimum 1/2" OD seamless copper tubing mechanically bonded to heavy ripple edged aluminum fins with thermal expansion valve, holding charge and copper tube stubs for field piping.
 - 1. Non-corrosive stainless steel or polymer drain pan with 3/4" NPT drain connection.
 - 2. 20 gauge steel coil casing with baked enamel finish and fiberglass insulation.
- G. Accessories:
 - 1. Horizontal concentric combustion air/flue vent termination assembly.
 - 2. MERV 13 pleated filters, supporting frame, and gasketed access doors as indicated on drawings.
- H. Flue vent and CA piping: Schedule 40 CPVC and PVC, respectively.
- I. Furnace Condensate Piping: Schedule 40 PVC.
- J. Approved Manufacturers:
 - 1. Carrier 59TP5A(dual stage) series or approved equal.

2.28 EVAPORATIVE COILS

A. Evaporator Coils: Furnish direct-expansion evaporator for upflow applications. Coil shall be mounted in an insulated coil plenum with pre-painted service panels and condensate pan with drain connections. Carrier CNPVP or approved equal

1. Condensate Piping: Schedule 40 PVC or schedule 40 galvanized in traffic areas.

2.29 REFRIGERANT PIPING

A. Refrigerant Piping: Furnish factory manufactured pre-charged refrigerant piping or type L ACR soft-temper copper tubing as shown on the plans for proper connections to condenser and evaporator coils, and as recommended by manufacturer of the condenser for this application.

B. Refrigerant piping shall be cleaned, dehydrated and capped. All joints shall be ASTM B32 grade 96TS silver-lead soldered joints.

C. Insulate refrigerant suction with 1/2" flexible unicellular insulation. Armstrong, Rubatex, Hallstead, or approved equal.

2.30 AIR COOLED CONDENSING UNITS

A. General: Self-contained, packaged, factory-assembled and prewired units suitable for outdoor use consisting of cabinet, compressors, condensing coils and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.

1. Refrigerants: R-410A.
2. Minimum EER: 13.0.
3. Electrical: 240 volt, 1-phase, 60 Hertz.

B. Materials: Use corrosion-resistant materials for parts in contact with refrigerant.

1. Cabinet: Galvanized steel (14 gauge) with baked enamel finish, and removable access doors or panels with quick fasteners.
2. PVC coated steel wire condenser coil guard.

C. Compressors: Hermetically sealed, 3500 RPM, resiliently mounted compressor with positive lubrication, crankcase heater, motor overload protection, service valves, and filter-drier.

1. Modular scroll compressors.
2. Extended compressor warranty: 5 years.

D. Condenser:

1. Coil: Seamless copper tubing with aluminum fins.
2. Fans: Vertical discharge, direct-drive axial fans, resiliently mounted with guard and motor.

E. Motors: Permanently lubricated ball bearing motors with built-in current and overload protection.

F. Controls:

1. High and low pressure cut-outs for compressor, oil pressure control, anti-cycle timer 5 min. (adj.) and reset relay.
2. Accessory Controls: As scheduled on Drawings.
3. Low-ambient variable-speed condenser head pressure controls(0 deg F), where scheduled.

G. Unit Controls:

1. 115 volt 1-phase fusing and control power transformer.
2. Magnetic contactors for compressor and condenser.
3. High/low pressure cutouts.
4. Reset relay.
5. Anti-recycle compressor timer.

H. Approved Manufacturer:

1. Carrier model 24ABB3 series or approved equal.

2.31 AIR-TO-AIR HEAT EXCHANGERS (Static Plate Enthalpy Recovery Type)

A. MANUFACTURERS:

1. RenewAire or approved equal.

B. GENERAL: Indoor draw-through energy recovery unit consisting of a static plate enthalpy heat exchanger, ventilation air supply fan and exhaust air fan, unit electrical wiring and related control wiring

C. UNIT CABINET: Cabinet shall be dual-walled constructed of 20-gauge G90 galvanized steel, insulated with minimum Rv4 foil-faced rigid insulation. The working components shall be fully accessible by a fully hinged access doors.

D. HEAT EXCHANGER CORE: Enthalpic heat exchanger core shall consist of laminar flow, fixed-media, cross-flow construction with no moving parts. Latent energy transfer shall be accomplished by direct water vapor transfer through molecular transport. Exhaust and fresh air streams shall be separated and not mix. Heat exchanger core shall not require defrost control or condensate removal.

E. FANS: Fans shall be DWDI forward-curved, direct-driven with internal vibration isolation, if specified. Unit shall be constant volume air units operating at the specified external static pressure.

F. MOTORS: Furnish ECM or VFD-driven motors having characteristics consistent with the torque and speed of the fans being driven. All motors shall be NEMA frames and be rated in accordance with NEMA performance standards for continuous full load performance at 40 degrees C temperature rise above ambient, with a 1.15 service factor. Motor horsepower and voltages shall be as scheduled.

G. FILTERS: Furnish 2" pleated MERV 8 filters and filter track on both entering air sides of unit. Filter rack may be integral with unit or installed independently in duct upstream of unit.

H. CONTROLS: All unit controls shall be factory wired so that only field connections are required. Unit shall provide terminal connections for fan interlock with air handling unit operation.

1. Provide 24 volt control relay-transformer for 240-volt/1-phase service.
2. Provide 0-10 VDC signal input terminal for controlling speed of fan motors.

I. ELECTRICAL: Single point power connection.

1. Electric Service: 240-volt, 1-phase.
2. Non-Fused Disconnect.

J. WARRANTY: Unit shall have 2-year warranty on all parts, excluding energy recovery core. Energy recovery core shall have a 10-year unconditional warranty.

2.32 TEMPERATURE CONTROLS

- A. This Contractor shall be responsible for all automatic electric controls for HVAC equipment as indicated on the plans and as described herein.
- B. Furnish all building automation controls, single-zone unit controls, motorized dampers, thermostats, protected relays, interlocks and transformers as required; and this Contractor shall mount same in suitable control panels, occupied space, or on equipment as required or specified herein. Furnish low voltage relays as required for all fans and motors automatically controlled.
- C. All temperature control wiring by HVAC Contractor. All exposed low voltage wire shall be run in EMT metal conduit per Division 16.
- D. Submittals: HVAC Contractor shall submit for approval by Engineer complete control wiring diagram and description of components and operation prior to ordering or installing temperature control system.
- E. Electrical power sources and motor connections for equipment will be provided by the Electrical Contractor. All power wiring by Electrical Contractor. Furnish necessary wiring diagrams, and be responsible for obtaining proper working installation. Furnish all starters, multi-speed switches and control apparatus.
- F. Automatic Control Dampers: Automatic Control Dampers(ACD) required but not included with fan equipment shall be furnished by this contractor.
 - 1. Dampers shall be opposite blade or parallel-type with blades not over 6" wide and with interlocking edges and brass or nylon bearings.
 - 2. Dampers shall be 16 gauge galvanized iron or heavier. Outdoor dampers (exposed to ambient conditions) shall be low-leakage type with neoprene blade and edge seals.
- G. Control Damper Operators: Provide electric motor operators for all dampers requiring operators, of the type which meet requirements of operation described in the sequence of control.
 - 1. Acceptable Manufacturer: Belimo or approved equal.
 - 2. Two-position, spring-return: Direct-coupled actuator, 24 VAC, spring-return, minimum torque 133in-lb(35 SF). Belimo model SF-24.
- H. Thermostats: Single-zone Control Systems
 - 1. Single-Zone Control System: Commercial programmable 7-day, communicating thermostats with room setpoint adjustment, occupied ventilation control relay, occupied override button, LCD display and related controls.
 - 2. 2-stage heating and 1-stage cooling.
- I. Carbon Dioxide Sensors:
 - 1. Standalone or intergral with temperature sensor, 2% accuracy, 0-2000 ppm, setpoint adjustable setting with LED readout, analog output and relay contact(default 800 ppm). Honeywell C7262 series, IAQPoint2 or approved equal..
- J. Relays: Furnish necessary relays, interlock control wiring and related accessories.

2.33 SEQUENCE OF CONTROL

- A. Furnace Units F-1 & 2 A&B(*Constant Volume Single-Zone with Heat Recovery*):

1. Occupied Mode: Supply fan run continuous. Minimum fresh air provided by heat recovery unit ERV-1. Space thermostat shall sequence stages of heating(2-stage) or mechanical cooling (1-stage) to maintain space temperature setpoint.
 2. Unoccupied Mode: Fan and heat or cooling stages shall cycle with unoccupied thermostat setpoint to maintain space temperatures. ERV-1 is deactivated.
 3. Morning Warm-up/Cool-down Mode: Upon morning warm-up/cool-down cycle, supply fan shall operate continuously with 100% return air and ERV-1 off; heat or cooling stages sequencing until return air reaches a preset warm-up or cool-down setpoint temperature.
- B. Energy Recovery Ventilator ERV-1:
1. Occupied Mode: Interlock operation with Furnaces F-1 or F-2 A&B occupied mode. Fresh air and exhaust fans shall run continuous at 50% speed with motorized fresh air and exhaust air dampers open.
 - a. Upon CO₂ space sensor sensing space(Gathering Space 100) CO₂ levels above 800 PPM(adj.), ERV controller shall ramp up ERV speed(VFD drive motor) from 50% to 100% speed.
 - b. Interlock automatic control damper on exhaust duct serving Gathering Space 100 with ERV-1 high speed operation to open 100%.
 2. Unoccupied Mode: Fresh air and exhaust air ERV fans shall be deactivated with motorized fresh air and exhaust air dampers closed.
- C. Radiant Floor Heating:
1. Boiler controller shall sequence burner and primary hot water pump to maintain setpoint heating water temperature in the buffer tank as sensed by an immersion aquastat. Buffer tank setpoint temperature shall be reset by the boiler controller based on outside ambient conditions.
 - a. HW setpoint temperature at design conditions = 110 deg F.
 - b. Reset HW from 80 deg F to 110 deg F based on outside ambient temperature.
 2. Radiant floor thermostat with remote sensor in slab shall open and close manifold valves to maintain setpoint radiant slab temperature.
 - a. Radiant slab setpoint temperature at design conditions = 85 deg F.
 3. Radiant floor circulation pump P-1 shall run continuously during the heating season.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Examine and check conditions at the actual job site and determine facilities for delivery, storing and handling of materials and equipment.
- B. Drawings show approximate locations of equipment, verify exact locations.
- C. Cooperate as necessary with other trades in order that all systems in the work may be installed in the best arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.

3.02 DUCTWORK INSTALLATION

- A. Ducts shall be constructed, supported and installed in accordance with the latest low-pressure duct standards of SMACNA. Install all turning vanes, access doors, extractors, and accessories as indicated or specified herein.

- B. Apply duct liner per manufacturer's recommendation.
 - 1. Apply duct liner with coated-side facing air stream and secured to the sheet metal with adhesive or with mechanical clips recommended by the manufacturer.
 - 2. All duct dimensions shall be increased to maintain the necessary free area of the duct.
- C. Fabricate and install all ductwork to be air tight in accordance with SMACNA Class B, seal. Evident air leaks in the ductwork shall be sealed.
- D. Seal exposed outside ductwork joints water tight with mastic sealant.
- E. Install all motor operated dampers per manufacturer's instructions in accordance with control sequence intended.
- F. Flexible Duct: Provide flexible duct in fully extended condition, free from sags and kinks.
 - 1. Use only the minimum length required to make the connection.
 - 2. Do not exceed 6' - 0" in length.
 - 3. Where horizontal support is required, provide at least 1" wide banding material hangers at not more than 36" centers.
 - 4. Make joints and connections with 1/2" wide positive locking straps or draw band.

3.03 RADIANT FLOOR INSTALLATION

A. SLAB-ON-GRADE INSTALLATION:

Fasten the tubing to the flat mesh or reinforcing bar in accordance with the PEX tubing manufacturer's installation recommendations.

- 1. Use closer tubing on-center distances along exterior walls. Increase tubing on-center distances as the installation moves away from the exterior wall.
- 2. Do not install tubing within 3 inches (152mm) of all exterior or interior walls.
- 3. When using high-density board insulation, staple the tubing to the insulation board with Foam Staples.
- 4. Use edge insulation when the heated panel directly contacts an exterior wall or panel.
- 5. Install tubing at a consistent depth below the surface elevation as determined by the project engineer.
- 6. Ensure sufficient clearance to avoid control joint cuts.
- 7. In areas where tubing must cross metal expansion joints in the concrete, ensure the tubing passes below the joints. Depending on the manufacturer's and structural engineer's recommendation, fibrous expansion joints may tolerate penetration.
- 8. For tubing that exits the slab in a 90-degree bend, use metal or PVC bend supports.

B. PIPING SYSTEM LEAK TESTS

Verify that the piping system being tested is fully connected to all components and that all equipment is properly installed, wired, and ready for operation.

- 1. For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

2. For air tests, gradually increase the pressure to not more than one half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached.
3. Examine all joints and connections with a soap bubble solution or equivalent method. The piping system exclusive of possible localized instances at pump or valve packing shall show no evidence of leaking. After testing is complete, slowly release the pressure in a safe manner.
4.

<u>System</u>	<u>Pressure</u>	<u>Medium</u>	<u>Duration</u>
Radiant Floor Water System	100 psig	Water	8 hr

3.04 INSTALLATION OF EQUIPMENT

- A. Locations: Install all equipment in the locations shown on the Drawings, except where specifically otherwise approved on the job by the Owner.
 1. Install all thermostats 5'-0" above finished floor.
- B. All equipment, as called for on the drawings and herein specified, shall be installed in strict accordance with manufacturer's recommendations.
- A. Interference: Avoid interference with structure, and with work of other trades, preserving adequate headroom and clearing all doors and passageways.
- B. Inspection: Check each piece of equipment in the system for defects, verifying that all parts are properly furnished and installed, that all items function properly, and that all adjustments have been made.
- C. Start-up Services: Provide factory trained start-up services for the rooftop equipment, air-air heat exchanger equipment and building automation/control equipment. Submit field reports and start-up log.

3.05 TESTING, ADJUSTING, AND BALANCING

- A. Provide all necessary personnel, equipment, and services and perform all tests necessary to demonstrate the integrity of the completed installation to the approval of the Owner and Architect. The air system shall be tested, adjusted and balanced in accordance with the latest edition of the Associated Air Balance Council (AABC) Procedural Standards, NEBB or equivalent by an independent TAB Contractor. TAB work performed by the HVAC Contractor shall not be accepted.
- B. Submit three (3) certified copies of the final report to Architect on applicable AABC reporting forms or equivalent for approval.
 1. Air volume at supply, return and exhaust inlets and outlets;
 2. Air volume at each fan/air handler unit for supply air, return/exhaust air and fresh air;
 3. Static pressure drops at filter assemblies, DX coils, mixing boxes, supply and return/exhaust plenum-ducts;
 4. Record fan speed, RPM, motor nameplates and amperage/voltage;
 5. Measure and record supply air, return/exhaust air, fresh air and mixed air temperatures. Record entering and leaving temperatures (dry bulb and wet bulb) at all coils and heating apparatus;
 6. Report all equipment model #'s and related drawing identification on the TAB report;
 7. Calibrate and balance all hydronic circuits and inline pumps and report water flows and pressure differences.

8. Record entering and leaving water temperatures at each boiler, along with entering and leaving radiant manifold temperatures.
- C. Upon completion of TAB work, mark equipment settings, including damper control levers, and similar devices to indicate final settings. Plug all holes in insulation, ductwork and housings with acceptable test plugs.
- D. Eliminate noise and vibration and assure proper function of all controls, maintenance of temperature, and operation with the approved design.

3.06 CLEANING

- A. Ductwork: After the ductwork has been tested and proved tight, thoroughly vacuum and clean all components of the ductwork. Remove all dirt, scale, oil and other foreign substances, which may have accumulated during the installation process.
- B. Equipment: After the equipment has been started and proved operational, carefully clean all accessible parts of each piece of equipment, thoroughly removing all traces of dirt, oil, grease and other foreign substances.

3.07 LUBRICATION

- A. Upon completion of the work and before turning over to the Owner, clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacturer.
- B. Contractor is responsible for maintaining lubrication of all mechanical equipment under his contract until the Owner accepts work.
- C. Furnish a chart with each piece of equipment listed, itemizing location for lubricant required and recommended periods of lubrication. Incorporate chart in Instruction Manual.

3.08 INSTRUCTIONS

- A. Instruct owner's representative in the operation and maintenance of all mechanical systems.
- B. Assemble two (2) complete sets of manufacturer's printed operating and maintenance instructions for all mechanical equipment installed under this contract. Prepare in bound copies with index tabs. Information must include parts list and wiring diagrams. Submit to Architect for presentation to the Owner.

3.09 CLOSEOUT OPERATIONS

- A. Refer to Division 1 for additional project closeout requirements.
- B. Closeout Equipment/System Operations: Sequence operations properly so that work of the project will not be damaged or endangered. Coordinate with seasonal requirements.
 1. Operate each item of equipment and each system in a test run of appropriate duration with the Owner's operating personnel present to demonstrate sustained, satisfactory performance.
 2. Adjust and correct operations as required for proper performance.

3. Clean and lubricate each system, and replace dirty filters, especially worn belts and parts and similar expandable items of the work.
- C. Instruction, O&M: Instruct Owner (Owner's personnel) in the proper operation and maintenance of the HVAC systems. Train personnel in the setting and scheduling of programmable thermostats for occupied/unoccupied periods.
- D. Service Organization: At time of substantial completion, Contractor shall provide Owner with a listing of qualified service organizations (including addresses and telephone numbers) for each piece of major equipment.
- E. Turn-Over of Operations: At time of substantial completion, turn over the prime responsibility for operation of HVAC equipment and systems to the Owner's operating personnel. However, during the guarantee period, provide and operating engineer, who is completely familiar with work, to consult with and continue training the Owner's personnel on an as-needed basis.

END OF SECTION

SECTION 26 00 00

ELECTRICAL

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide complete electrical service and distribution system with equipment and materials where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Underground Electric Service (200-amp, 1-phase, 120/240 volt), meter cabinet, distribution panel with main circuit breaker, SPD device and branch circuit breakers;
2. Branch circuit wiring, for lighting, receptacles, motors and equipment;
3. Lighting fixtures;
4. Wiring system for equipment and controls provided under other Sections of these Specifications including General Construction, Plumbing and HVAC trades;
5. Hangers, anchor sleeves, chase supports for fixtures, and other electrical materials and equipment;
7. Other items and services required to complete the electrical systems.
8. Fire alarm system per specification 28 30 00.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications;
2. Equipment structural supports, etc.;
3. All line voltage control wiring and starter interlocks, where specified;
4. Final equipment electrical connections.

C. Work of Other Sections:

- HVAC
1. Low-voltage (less than 100 volts) controls for General Construction, Plumbing, and trades.

1.02 GENERAL PROVISIONS

A. Everything essential for the completion of the work implied to be covered by these Specifications to make the system ready for normal and proper operation must be furnished and installed by this Contractor. Accordingly, any omission from either the plans or the Specifications, or both, of details necessary for the proper installation and operation of the system shall not relieve this Contractor from furnishing such detail in full and proper manner.

B. In addition to the electrical plans, see General Plans of the building, as all electrical work appearing on the latter plans will be part of this contract unless especially specified to be done by other contractors, as well as, the said work detailed on the electrical plans.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced 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.

B. Without additional cost to the Owner, provide such other labor and materials as required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Reference Standard: The following standards are imposed, as applicable to the work:

ASTM	American Society of Testing and Materials
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories

1.04 CODES AND PERMITS

A. The Contractor must comply with national, state of Wisconsin and city of Kenosha building and electrical codes and other ordinances in force where the building is located as far as same apply to his work.

1. IBC 2009;
2. IEEC 2009;
3. NEC 2008;
4. Wisconsin Electrical Code SPS 316 sections.

B. He must secure permits from proper offices and pay fees as may be necessary for fulfilling the requirements of these Specifications.

C. One (1) copy of all permits must be furnished to the Owner.

D. Electric Service Fee: Electrical Contractor shall secure and pay all fees for new electrical service from electric utility, including temporary power services.

1.05 COORDINATION

A. Cooperate and coordinate with other trades to assure that all systems in the electrical work may be installed in the best arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.

B. Arrange electrical work in neat, well-organized manner with piping and similar running parallel with primary lines of building construction.

C. Locate operating and control equipment properly to provide easy access, and install entire electrical systems with adequate access for operation and maintenance.

D. Give right-of-way to piping which must slope for drainage.

1.06 ELECTRICAL PROVISIONS OF THE MECHANICAL WORK

A. Line Voltage Wiring: The Electrical Contractor shall make all line voltage (100 volts and greater) electrical wiring, final connections and motor wiring for Mechanical equipment.

B. Control Wiring: Low-voltage (less than 100 volts) control wiring in conjunction with Mechanical work shall be by the Mechanical Contractor in strict accordance with the applicable sections of the Electrical Specifications.

C. Motors, Starters, and Disconnects: All motors starter and disconnects shall be provided by the Electrical Contractor, unless provided with the equipment or indicated otherwise.

1. Mechanical Contractors shall furnish list of and location of all Mechanical equipment and requirements for electrical connections, along with wiring diagrams.

1.07 FLOOR, WALL, ROOF AND CEILING OPENINGS

- A. The General Contractor will be required to leave openings in new construction ceiling, floors, walls, roof, partitions, etc., as required to install the Electrical work specified or shown on the Drawings. The Electrical Contractor is responsible for correct size and location of openings.
- B. Provisions for openings, holes and clearances through new construction walls, floors, ceilings and partitions are to be made in advance of construction of such parts of the building.
- C. The Electrical Contractor shall set sleeves and anchors for all equipment, etc., and shall provide watertight seals on pipes through exterior walls, floors and roof locations, and where noted on the Drawings.

1.08 CUTTING AND PATCHING

- A. General: Refer to Division 1 General Requirements.
- B. Perform all cutting and patching required for complete installation of the Electrical systems, unless specifically noted otherwise. Provide all materials required for patching unless otherwise noted.
 1. All cutting and patching necessary of structural members to install any Electrical work shall not be done without permission, and then only carefully done under the direction of the Architect and General Contractor.

1.09 TRENCHING AND BACKFILLING

- A. Comply with pertinent provisions of Division 1.
- B. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of Division 2 of the Specifications.

1.10 SUBMITTALS

- A. Comply with pertinent provisions of Division 1.
- B. Shop Drawing Submittals: Submit six (6) copies of shop drawings to the Architect for approval, with complete detail for all equipment, materials, etc., to be furnished and installed for this project as follows:
 1. Electric Service Equipment;
 2. Distribution Panelboards;
 3. Starters and Disconnects;
 4. Light Fixtures;
 5. Electrical Devices.
- C. Shop Drawings:
 1. The Electrical Contractor will be held responsible for correction of work deemed necessary by the Engineer due to proceeding with the electrical work without approved shop drawings that have the Architect/Engineers final approval.

2. Shop drawings shall include data on physical dimensions, gauges, materials of construction and capacities. Incomplete drawings will be disapproved.
 3. This Contractor will be responsible for all figures, quantities and dimensions shown on the shop drawings.
 4. Approval of shop drawings describing equipment that cannot fit in the space allotted does not relieve this Contractor from responsibility of resubmitting equipment that will meet the space requirements.
- D. O & M Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Architect two (2) copies of an operation and maintenance manual compiled in accordance with the provisions of Division 1 of these Specifications. Include the following within the bound O&M manual:
1. Copy of the approved Record Documents for this portion of the Work;
 2. Copies of all warranties and guaranties.
 3. As-built drawings.
- E. As-built Drawings: Record installation as-built on a set of blue-line prints during construction. Plan shall represent actual locations, materials and circuiting of equipment installed.

1.11 PRODUCT HANDLING

- A. Comply with pertinent provisions of Division 1.

1.12 WARRANTY

- A. In addition to standard one year warranty on all labor and materials, provide an additional warranty on ballasts for all new fluorescent and HID lighting fixtures as specified.

1.13 HOUSEKEEPING AND CLEAN-UP

- A. Periodically as work progresses and/or as directed by the Architect, the Contractor shall remove waste materials from the building and leave the area of the workroom clean. Upon completion of work remove all tools, scaffolding, broken and waste materials, etc., from the site.

1.14 TEMPORARY SERVICES

- A. This Contractor shall provide temporary lighting and power as required throughout the construction period.
- B. Arrange for temporary electrical utility with local electrical utility. Electrical Contractor shall pay all temporary electrical service and usage fees.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide only materials that are new, of the type and quality specified. Where Underwriters' Laboratories, Inc. has established standards for such materials, provide only materials bearing the UL label.

2.02 SERVICE ENTRANCES AND METERING

- A. New Service: Provide new underground 200A, 120/240 volt, 1-phase, 3-wire electric service from pad-mounted transformer as required by the local electrical utility (Waunakee) and as shown on Drawings.

- B. Metering: Provide metering sockets and cabinets, and related metering equipment per local electrical utility requirements.
- C. Main Switches: Provide a 200-amp main circuit breakers in the service distribution panel with current limiting capabilities to meet utility AIC requirements.
- D. Service Distribution Panel (Panel 'A'):
 - 1. Provide 200-amp, 1-phase main distribution panel as indicated on plans complete with 200-amp main circuit breaker, 10,000 AIC branch circuit breakers, NEMA 1 enclosure, main service ground and solid neutral buss lugs and other components required for a complete installation.
 - 2. SPD service device as specified herein and scheduled on Drawings.

2.03 SURGE PROTECTIVE DEVICES

- A. The surge protective device (SPD) shall be designated a location Type 2 device intended for in installation on the load side of the service equipment overcurrent device, including SPD's located at the branch panel. The SPD shall be listed in accordance with UL 1449.
- B. The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV's with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.
- C. The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.
 - 1. MCOV = 150 volt.
- D. Protection Modes: The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for grounded wye configured systems. For a delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.
- E. Voltage Protection Rating (VPR): The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:
 - 1. Surge current per phase rating: 80kA
 - 2. 240/120 volt applications: 900V L-N, 1200V L-G, 700V N-G, 1500 L-L
- F. Nominal Discharge Current (In): The SPD shall have a UL 1449 Nominal Discharge Current Rating (In) of not less than 20kA.
- G. Short Circuit Current Rating (SCCR): The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

2.04 GROUNDING SYSTEM

- A. Ground all equipment, including switches, transformers, conduit systems, motors, and other apparatus, by conduit or conductor to cold water main and to independent electrode, using ground clamps manufactured by Burndy or T&B, and approved by the Engineer.
- B. Provide new service grounding electrode system. Add ground rods, foundation rebar ground and water service grounding electrodes as required per NEC 250.50 for a common grounding electrode system.

- C. Provide grounding conductor from service ground to solid ground buss bar at all distribution panelboards.
- D. Provide grounding jumper from electrical devices to the metallic device boxes.
- E. GFI receptacles shall be provided with separate insulated ground wire conductor to the main service ground bar.
- F. Ground all motor and equipment connections with dedicated ground conductor.

2.05 IDENTIFICATION

- A. Junction and pull boxes shall be stenciled utilizing a coded identification system. The following junction and pull boxes shall be identified using a coded system. Coding shall be submitted to Engineer for approval.
 - 1. Light and Power - 120/240V;
- B. Label circuit numbers for all accessible line voltage power distribution raceways and junction boxes.
- C. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely fastened to the following equipment. Size 1" x 4" with 3/8" high letters unless space available dictates differently.
 - 1. Panelboards.
- D. Typewritten Directory: Each panelboard shall be provided with a typewritten directory in a steel frame with plastic cover contained on the inside of panel door. These directories shall indicate load served and rooms served by each protective device in the respective panel.
- E. Identify all conductors per NEC:
 - 120/240V - Phase A - Black
 - Phase B - Red
 - Neutral - White
 - Ground - Green

2.06 POWER DISTRIBUTION SYSTEM

- A. See plans for panelboard capacity, voltage ratings, and branch circuit breaker units.
- B. All panelboards to be of the circuit breaker type with plug-on circuit breakers.
- C. Branch circuit breakers shall be thermal magnetic; quick-make and quick break. Multi-pole breakers to have common trip. Handle ties of any sort not allowed.
- D. Panelboards shall be Square "D" type NQOD with bolt-on branch circuit breakers, 10,000 Amp I.C.
- E. Panelboard of comparable construction and arrangement as manufactured by Cutler Hammer, General Electric or ITE, shall be considered acceptable alternates.
- F. Each panel shall be provided with a typewritten directory mounted on inside of panel door and covered with clear plastic. This directory shall indicate the load supplied by each branch circuit breaker in panel. Room numbers shall be actual room numbers.

G. Each panelboard shall be securely attached to the building structure on 3/4" AC plywood backer board with non-metallic painted surface.

H. All panelboards shall be equipped with an equipment grounding bar that is separate from the solid neutral bar.

2.07 WIRING DEVICES

A. General:

1. Devices shall be provided at each location shown on the plans or called for in the Specifications.
2. All devices shall be of one manufacturer. Acceptable manufacturers: Leviton, Pass and Seymour, Hubbell or General Electric.
3. Device catalog references herein and on the plans are to be considered as standards of comparison. Comparable devices manufactured by the other manufacturer will be considered as an optional choice.
4. Device and plate finish colors to be selected by Architect.

B. Receptacles:

1. Duplex Receptacles: Industrial-specification grade, nylon face and base, NEMA 5-15R, 15A, tamperproof, side-wired only, 3-wire grounding type with the third terminal U-shaped and grounded to the conduit system or green wire ground. Use of self-grounding option not permitted.
 - a. 15-amp: Leviton 5262;
 - b. 20-amp: Leviton 5362;
2. GFCI Receptacle: Industrial-specification grade, NEMA 5-15R or 20R with indicator light and feed through. Provide tamper resistant devices in public areas.
 - a. 15-amp: Leviton 7599;
 - b. 20-amp: Leviton 7899;

C. Switches:

1. All toggle switches used to control lighting shall be 20 amp rated for 120/277 volts, A.C., industrial-specification grade.
2. 15 amp switches shall not be used unless specifically shown otherwise for special control.
3. Switches to be back and side wired, silent or quiet type.
4. The following catalog numbers refer to Leviton, Inc.:
 - a. single pole – 1221-2;
 - b. three way – 1223-2;
 - c. four way – 1224-2;
 - d. Single pole with pilot light – 1221-PLR;

D. Plates:

1. Provide as required for each outlet, single or multiple gang.
2. Provide blank covers on all empty boxes or outlets.
3. Plates shall be 204 stainless steel or nylon construction in all finished areas.
4. Galvanized steel box covers shall be used in unfinished areas. Cover shall be 1/2" raised with no sharp edges.
5. Provide single-gang die-cast or impact resistant thermoplastic covers and gasketed bases NEMA-3R rated "while-in-use" equal to Leviton 5976-GY (vertical) or 5996-GY(horizontal) on receptacles in damp or exterior locations.

2.08 RACEWAY SYSTEM

- A. Steel Conduit: Galvanized or sheradized steel intermediate or rigid metal conduit, or electrical metallic tubing (EMT) with steel set screw or compression ring type fittings.
1. Provide steel conduits as all exposed in the work areas.
 2. Where conduit is installed underground or in the floor slab, provide rigid galvanized steel conduit, or PVC coated steel conduit is acceptable.
- B. Rigid Non-Metallic Conduit: Schedule 40 PVC with solvent welded fittings.
1. Below grade installation only.
 2. Encase in concrete below drives and roadways.
- C. Electrical Non-Metallic Tubing(ENT):
1. Above grade indoor concealed installation only, for branch circuit wiring after the first metallic junction box from the panelboard.
 2. Not allowed for service conduit and panelboard feeders.
 3. Provide and install per NEC Article 331 with grounding conductor.
- D. Outlets, Junction Boxes and Switch Boxes:
1. Provide standard one-piece units, galvanized or sheradized, of shape and size best suited to that particular location, of sufficient size to contain enclosed wires without crowding.
 2. Provide deep boxes(2-1/8") with 1" and larger conduit.
 3. For lighting outlets, provide standard 4" octagon or square units, with 3/8" malleable iron fixture studs and box hangers where required.
 4. For switches and receptacles, provide boxes 4" square by 1-1/2" deep minimum with rings and covers as required.
- E. Low Voltage Cabling Raceways:
1. Provide 4" square boxes with single device ring and 3/4" raceway stubbed to accessible area at ceiling with insulating bushing.
 2. In areas with no ceiling, extend raceway to adjacent accessible ceiling space or to telephone backboard or as directed by Owner.
 3. Provide pull string for all low-voltage raceways.
- F. Pull Boxes:
1. Provide galvanized code-gauge sheet units with screw-on covers, of size and shape required to accommodate wires per NEC wire bending requirements, without crowding access and to suit the location.
- G. Provide sleeves and chases where conduits pass through floors and walls.

2.09 CONDUCTORS

- A. Wire and Cable (600 Volt): Provide 600 V insulated copper wire and cable, NEC standard, of types specified below for different applications, with UL label, and color coded as required by governmental agencies having jurisdiction. Use only copper wires and cables.
1. With conductors No. 4 and larger, provide insulating bushings.
 2. Wire and cable shall be THHN or THWN.

3. Branch circuit wiring installed in wiring channels of continuous row-mounted fixtures shall be provided. UL listed type RHH or other approved 90 degree C wires, rated at 600 V.
4. Wire No. 10 and smaller shall be solid or stranded wire; wire larger than No. 10 shall be stranded wire.
5. Wire in conduits subjected to direct sunlight shall be THWN or RHWN.
6. Provide XHHW/CU wiring in underground exterior conduit.
7. Identify feeder neutrals with white tape or white paint.
8. All low-voltage wiring located in accessible areas shall be installed in metallic conduit.
9. Provide separate identified neutral conductor for emergency and exit lighting circuits.
10. All branch circuit conductors shall be connected by means of a screw terminal.

B. Armored Cable (AC) or Metal-Clad Cable (MC):

1. Limit AC and MC usage to concealed only locations, branch-circuit wiring after the first junction box from the panelboards; where approved by NEC, state and local electrical inspecting authorities.
2. Not allowed for Panelboard feeders or service conduit.
3. Provide and install per NEC Articles 333 and 334 with grounding conductor.

2.10 MOTOR WIRING

- A. See plans for approximate location and sizes of all motors. Verify exact locations at job site with the contractor that is furnishing the motor driven equipment.
- B. The Drawing motor schedules indicate that the anticipated horsepower loads and circuit sizes. Verify all these requirements with contractor concerned and install accordingly under this contract.
- C. Install disconnect means where required by code for motors out of sight of controller. These shall be fusible safety switches, fusetron box cover unit, or non-fused switch as indicated on plans. All switches shall be horsepower rated.
- D. All motors will be furnished and installed by others, unless noted otherwise.
- E. Motor starters to be provided and installed by the Electrical Contractor unless indicated otherwise herein or on the plans. See Motor Schedule.
- F. All final connections to motors to be made by this Contractor.
- G. All motors to be connected using flexible metallic conduits extending from motor box to outlet box. Use liquid tight flexible metallic conduit with PVC covering in wet or oily locations and for all motors within 12" of floor. See paragraph on GROUNDING. All wires in flexible metallic conduit shall be stranded. Grounding wires shall be in all cases installed in flexible conduit and not wrapped around the outside of the conduit.

2.11 MOTOR STARTERS

A. General:

1. Indoor - NEMA Type 1.
2. Outdoors or where exposed to moisture - NEMA Type 3R, raintight.
3. Units shall open all ungrounded conductors simultaneously.
4. All starters shall be from a single manufacturer.
5. Approved Manufacturers: Allen-Bradley, Cutler Hammer, Square D and Siemens.

B. Manual Starters:

1. For single-phase starters, provide units of tumbler switch type that clearly indicate ON, OFF and TRIPPED positions.
2. For three-phase starters, provide pushbutton operated units with START, STOP-RESET button on the enclosure cover.

C. Magnetic Starters:

1. Provide units with operating coils designed to operate on line voltage or any other auxiliary voltage indicated on the Drawings.
2. For starters with line voltage operating coils, provide built-in under-voltage release.
3. Provide units with the accessories and auxiliary contacts needed for automatic or remote operation as shown on the Drawings.
4. Provide "H-O-A" control switch and "green" run light on unit cover.
5. Provide thermal overload protection in each phase which if any phase trips causes the starter to drop out.

2.12 SAFETY SWITCHES

- A. Provide safety switches of general duty type, horsepower rated, quick-make and quick-break design, externally operated with provision for padlocking, fusible or non-fusible as shown on the Drawings.
- B. Provide enclosures clearly marked for maximum voltage, current, and horsepower rating, and:
 1. Indoor: NEMA type 1.
 2. Outdoor: NEMA type 3R, raintight.
- C. Approved Manufacturers: Square D, Cutler Hammer or Siemens.

2.13 LIGHTING FIXTURES

- A. Provide fixtures of the types shown on the Drawings, and with the following accessories as applicable.
- B. Light Fixtures:
 1. Provide units having a UL label.
 2. Provide local label in addition if so required by governmental agencies having jurisdiction.
 3. Verify all ceiling types as shown on final architectural plans and be responsible for ordering proper fixtures and accessories for the proper ceiling.

C. LED Lighting:

1. The manufacturer of the LED lighting fixture shall utilize high-brightness LED's and high-efficiency electronic LED drivers, dimmed or no dimmed as required.
2. The LED fixture shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the fixture is to be installed
3. Light output of the LED system shall be the absolute photometry following IESNA LM-79 and IESNA LM-80 requirements and guidelines.
4. Minimum power factor of 0.90.
5. LED lighting fixture shall be mercury-free, lead-free and RoHS compliant.
6. The LED lighting fixture shall maintain 70% lumen output for a minimum of 50,000 hours.

7. All components of the LED lighting fixture shall be replaceable.
8. The LED lighting fixture shall carry a limited 3-year warranty minimum.

D. Acceptable Lighting Fixture Manufacturers:

1. Refer to Fixture Schedule. Engineer will evaluate and make final decision on whether submitted fixture is equal to specified light fixture.
2. Other fixture manufacturers who consider their products equal to those specified are required to request pre-approval for bidding as base bid in accord with Instructions to Bidders section.

2.14 OCCUPANCY SENSOR CONTROLS

A. Occupancy Sensors shall be equal to Sensor Switch or approved equal. Refer to Occupancy Sensor schedule on the Drawings for specific types required.

1. All sensors shall be capable of operating normally with electronic fluorescent ballasts and LED driver systems and rated motor loads.
2. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
3. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
4. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

B. Wall Sensors:

1. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.
2. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180° coverage capability.
3. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
4. Wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.

C. Passive Infrared Sensors:

1. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.
2. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.

D. Ultrasonic Sensors:

1. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
2. Ultrasonic operating frequency shall be crystal controlled at 25 kHz within $\pm 0.005\%$ tolerance, 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

E. Dual Technology Sensors:

1. Dual technology sensors shall be corner mounted to avoid detection outside the controlled area when doors are left open.
2. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.

2.15 LIGHTING CONTROLS

- A. Time clock: 7-day, battery back-up, programmable electronic time clock with daylight savings time settings.
- B. Lighting Contactor: 2-pole, magnetic normally open, mechanically latched, 30-amp 120-volt control voltage.
- C. Photocell: Adjustable photo illumination setpoint, 30-amp, SPDT normally closed, weatherproof construction.

2.16 VOICE/DATA CONDUIT SYSTEM

- A. Provide back box, raceway system and blank plate for all voice/data locations indicated on plans.
- B. Provide data service backboard and conduit stubbed out of the building for the underground telephone service cabling.

C. Raceway Size and Bend Schedule:

<u>#Cables</u>	<u>Conduit Size</u>	<u>Min. Radius Bend</u>
<4	¾" dia. min.	8"
5-7	1" dia.	11"
8-12	1-1/4" dia	14"
13-16	1-1/2" dia	16"

2.17 TELEPHONE SERVICE RACEWAY

- A. Provide 2" service conduit stubbed outside the building 24" below grade and capped from the mechanical room for future telephone or data services. Coordinate locations with Owner.

2.18 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Coordination:

1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
 2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the work schedule.
 3. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.
- B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction and the Drawings and Specifications should be used only for guidance in such regard.
- C. Where outlets are not specifically located on the Drawings, locate as determined in the field by the Architect. Where outlets are installed without such specific direction, relocate as directed by the Architect and at no additional cost to the Owner.
- D. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the drawings and actual measurements at the site of construction.
- E. The Electrical Drawings are diagrammatic, but are required to be followed closely as actual construction and work of other trades will permit. Where deviations are required to conform with actual construction and the work of other trades, make such deviations without additional cost to the Owner.

3.03 INSTALLATION OF ELECTRIC SERVICE

- A. Coordinate installation with local utility as required for a complete electric service installation.
- B. Installation shall be approved by the local utilities.

3.04 TRENCHING AND BACKFILLING

- A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of Division 2 of these Specifications.
- B. Cut bottom of trench to grade, make trench 12" wider than the widest dimension of the pipe.
- C. Bedding and backfilling:
 1. Install piping promptly after trenching. Keep trenches open as short a time as practicable.
 2. *Under the building slab:* Install all pipes on a compacted bed of damp sand 6" deep. Do not lay piping on large stones, rocks or bricks.
 3. *Outside the building:* Install all underground piping on a compacted bed of damp sand 6" deep. Backfill to within 12" of finish grade with damp sand. Backfill the remainder with native topsoil. Backfill in layers and compact sufficiently to prevent settlement.
 4. Do not start backfill operations until underground plumbing work has been properly inspected and approved by governing authorities.

3.05 INSTALLATION OF RACEWAYS AND FITTINGS

- A. Where conduit is installed concealed in walls or above ceiling, or exposed in work areas, provide rigid galvanized conduit or electrical metallic tubing with compression type fittings.
 1. Seal joints to prevent entrance of water.

2. Provide ground wire of proper size per NEC 250.
 3. Use nylon (rather than steel) fish tape.
- B. Use flexible conduit only for short motor connections, or where subject to vibration.
- C. Provide necessary sleeves and chases where conduits pass through floors and walls and provide other necessary openings and spaces, arranging for proper time to prevent unnecessary cutting in connection with the Work.
- D. Where conduit is exposed, run parallel to or at right angle with lines of the building.
- E. Securely and rigidly support conduits throughout the work.

3.06 INSTALLATION OF LIGHTING FIXTURES

- A. Install lighting fixtures complete and ready for service in accordance with the Lighting Fixture Schedule shown on the Drawings.
- B. Wire fixtures with fixture wiring of at least 90 degrees C rating. Where fixtures are mounted in continuous rows, provide conductors in wiring channels of the same size as the circuit wires supplying the row of fixtures.
- C. Use only bonderized, galvanized, or sheradized steel for fixture installation for protection against rust and corrosion, and install fluorescent fixtures straight and true with reference to walls.
- D. Install all lighting fixtures, including those mounted in continuous rows, so that the weight of the fixture is supported, either directly or indirectly, by a safe and sound structural member of the building, using adequate number and type of fastenings to assure safe installation.
1. Screwed fastenings, and toggle bolts through ceiling material or wall paneling, are not acceptable.

3.07 INSTALLATION OF POWER EQUIPMENT

- A. Provide power and control wiring for motor starters and safety switches as shown on the Drawings.

3.08 INSTALLATION OF CONDUCTORS

- A. Unless otherwise shown on the Drawings or noted in these Specifications, use No. 12 AWG conductors for all branch circuits, protected by 20 amp circuit breakers. For runs exceeding 100 feet, use larger wires to limit voltage drops.
- B. Use identified (white) neutrals and color-coded phase wires for all branch circuit wiring.
1. Make splices electrically and mechanically secure with pressure-type connectors.
 2. Provide "Scotchlok", Buchanon "B-cap", or Ideal "Wing-nut" connectors for wires sizes 6 AWG and smaller.
 3. Provide Burndy compression-type connectors, "Hydent" or equal applied with a mechanical tool and die equipment for wire sizes 4 AWG and larger.
 4. Insulate splices with a minimum of two half-lapped layers of Scotch Branch No. 33 vinyl-plastic electrical tape where insulation is required.

3.9 INSTALLATION OF PANELBOARDS

- A. Unless otherwise shown on the Drawings, install panels with the top of the trim 6'-3" above the finished floor.

- B. Mount a typewritten directory behind plastic on the inside of each panel door and on the directory, showing the circuit number and complete description of all outlets on each circuit.

3.10 TESTING AND INSPECTION

- A. Provide personnel and equipment, make required tests, and secure required approvals from the Architect and governmental agencies having jurisdiction.
- B. Make written notice to the Architect adequately in advance of each of the following stages of construction:
 - 1. Test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner.
 - 2. Immediately submit to the Architect a report of maximum and minimum voltages and a copy of the recording volt-meter chart.
 - 3. Also measure voltages between phases and between phase wires and neutrals and report these voltages to the Architect.

3.11 PROJECT COMPLETION

- A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil, and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.
- B. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under Article 1.3 of this Section of these Specifications.

END OF SECTION

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SECTION 28 30 00

FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Furnish all labor, equipment, materials, and performing all operations in connection with the installation of the Fire Alarm System as shown on the drawings, as hereinafter specified, and as directed by the Engineer.
1. New addressable multiplexing fire alarm system.
 2. The Contractor shall visit and inspect existing facility to determine extent of fire alarm work and to meet requirements of this specification and existing conditions.
- B. The Fire Alarm System shall consist of all necessary software, field wiring and equipment to perform all fire alarm, detection, and annunciation operations.
1. Smoke and heat detector coverage and annunciation per NFPA 72 and ADA.
 2. Central monitoring control panel with LED annunciator panel.
- C. Fire Alarm Equipment shall Include:
1. Fire-alarm control panel.
 2. Smoke and heat detectors.
 3. Pull stations.
 4. Monitor and Relay modules.
 5. Notification appliances.
 6. Addressable interface devices.
 7. NAC power panels
 8. Digital alarm communicator(DAC) transmitter.
- D. The Fire Alarm System shall consist of all necessary software, field wiring and equipment to perform all fire alarm, detection, and annunciation operations.
3. Partial smoke and heat detector coverage and annunciation per NFPA 72 and ADA.
 4. Central monitoring control panel with LED annunciator panel.
 5. Monitor fire protection sprinkler system and zone flows.
 6. Audio/visual alarming.
- E. The Fire Alarm Sub-contractor shall be responsible for advising the Engineer ten(10) days prior to the bidding date of any omissions required to meet the local, state and federal requirements for the fire alarm installation. After this date, the additional requirements for a complete installation of the fire alarm system shall become the responsibility of the Fire Alarm Sub-contractor.
- E. The Fire Alarm Sub-contractor shall provide final fire alarm design responsibility for the project and submit all plans, plan approval fees, calculations and related to the State of Wisconsin / Village of Waunakee Fire Department to provide required approvals necessary to obtain facility occupancy for the Owner.

1.2 RELATED DOCUMENTS

A. Applicable provisions of Division 1 shall govern work under this section.

B. Specified Elsewhere:

1. Division 21 Fire Protection
2. Division 23 HVAC
3. Division 26 Electrical

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Electric Code, Article 760.
2. National Fire Protection Standards:
 - a. NFPA 71: Central Station Signaling Systems - Protected Premises Unit.
 - b. NFPA 72A: Local Protective Signaling Systems.
 - c. NFPA 72D: Protective Signaling Systems - Protected Premises Unit.
 - d. NFPA 72E: Automatic Fire Detectors.
3. Local and state building codes.
4. IBC 2008.
5. IFC 2008.
6. All requirements of the local authority having jurisdiction.
7. Underwriter's Laboratories: The system and all components shall be listed by Underwriters Laboratories, Inc. for use in fire protective signaling systems under the following standards as applicable.
 - a. UL 864: Control Units for Fire Protective Signaling Systems.
 - b. UL 268: Smoke Detectors for Fire Protective Signaling Systems.
 - c. UL 268A: Smoke Detectors for Duct Applications.
 - d. UL 217: Smoke Detectors, Single and Multiple Station.
 - e. UL 521: Heat Detectors for Fire Protective Signaling Systems.
 - f. UL 228: Door Closers/ HOLDERS for Fire Protective Signaling Systems.
 - g. UL 464: Audible Signaling Appliances.
 - h. UL 1638: Visual Signaling Appliances.
 - i. UL 38: Manually Actuated Signaling Boxes.
 - j. UL 346: Waterflow Indicators for Fire Protective Signaling Systems.
 - k. UL 1481: Power Supplies for Fire Protective Signaling Systems.

B. Each and all items of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment is to be listed under UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.

C. The equipment and installation supervision furnished under this specification is to be provided by a manufacturer who has been engaged in production of this type of equipment for at least five (5) years, and has a fully-equipped service organization within one hundred(100) miles of the installation.

1. All control equipment must have transient protection devices to comply with UL864 requirements.

D. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

E. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level IV technician.

- F. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.
- H. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an approved alarm company.

1.4 SUBMITTALS

- A. Submit in accordance with Section 26 05 00.
- B. Submit complete documentation showing the type, size, rating, style, catalog number, manufacturer's names, photos and or catalog data sheets for all items to ensure compliance with these specifications.
- C. Submit complete point to point wiring diagrams.
- D. Submit point list for owner to complete custom label requirements.
- E. All references to manufacturer's or supplier's model numbers and other pertinent information herein is intended to establish minimum standards for performance, function and quality. Equivalent equipment (compatible UL listed) from other manufacturers may be substituted for that specified providing the submittal is performed as specified above.
- F. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - 1. Include voltage drop calculations for notification appliance circuits.
 - 2. Include battery-size calculations.
 - 3. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 4. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
 - 5. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
- G. Operation and Maintenance Data: For fire-alarm systems and components to be included in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data, include the following:
 - 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
 - 2. Provide "Record of Completion Documents" according to NFPA72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.

3. Record copy of site-specific software database file, hardcopy print-out and CD, with password for delivery to the owner. Proprietary system/service companies will not be acceptable.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals (hardcopy) and electronic on CD.
5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.

H. Software and Firmware Operational Documentation:

1. Provide a list of global system settings
2. Provide a list of the contents of each system cabinet and their settings
3. Provide a list of all addressable devices with their addresses and settings

1.5 WARRANTY AGREEMENT

- A. The contractor shall warranty all materials, installation and workmanship for three (3) years from date of acceptance, unless otherwise specified. A copy of the manufacturers' warranty shall be provided with closeout documentation and included with the operation and installation manuals.
- B. The System Supplier shall maintain a service organization with adequate spare parts stocked within 100 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the Owner notifying the contractor.
- C. Technical Support: Beginning with Substantial Completion, provide software support for three (3) years, shall be included in this project.

1.6 DELIVER, STORAGE AND HANDLING

- A. Deliver equipment individually wrapped in factory fabricated fiberboard type containers.
- B. Store equipment in clean, dry space.
- C. Protect from dirt, fumes, water and physical damage.
- D. Do not install damaged equipment, remove from site.

1.7 GENERAL

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected, and left in first class operating condition.
- B. The system shall use closed loop initiating device circuits with individual zone supervision, individual notification appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations, automatic fire detectors, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.

1.8 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
1. Manual stations.
 2. Heat detectors.
 3. Smoke detectors.
 4. Duct smoke detectors.
 5. Verified automatic alarm operation of smoke detectors.
 6. Automatic sprinkler system water flow or air pressure drop.
- B. Fire-alarm signal shall initiate the following actions:
1. Activate the audio and visual notification appliances.
 2. Identify alarm at fire-alarm control unit and remote annunciators.
 3. Transmit an alarm signal to the remote alarm receiving station.
 4. Unlock electric door locks in designated egress paths.
 5. Release fire and smoke doors held open by magnetic door holders.
 6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 7. Recall elevators to primary or alternate recall floors.
 8. Record events in the system memory.
 9. Record events by the system printer.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Sprinkler flow switches.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Retain only those devices and actions in subparagraphs below that are applicable to Project.
 2. Coordinate with requirements in other Sections that specify listed devices and systems.
 3. Open circuits, shorts, and grounds in designated circuits.
 4. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 5. Loss of primary power at fire-alarm control unit.
 6. Ground or a single break in fire-alarm control unit internal circuits.
 7. Abnormal ac voltage at fire-alarm control unit.
 8. Break in standby battery circuitry.
 9. Failure of battery charging.
 10. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer.
- F. General – Audio: Upon alarm activation of any area smoke detector, heat detector, manual pull station, sprinkler waterflow, the following functions shall automatically occur:
1. The internal audible device shall sound at the control panel or command center.
 2. The LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location and time/date.
 3. All system activity/events shall be documented on the system printer.
 4. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.

5. The following audio messages and actions shall occur simultaneously: An evacuation message shall be sounded for general alarm throughout the building. Owner to select tone and message for review by Dubuque Fire Marshall.
6. Activate all visual strobes throughout the building. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
7. Provide selective paging to each individual floor (zone). In addition to the message/channels detailed above, a dedicated page channel shall be capable of simultaneously providing live voice instructions without interrupting any of the messages listed above shall be provided.
8. Transmit signal to the central station.
9. Activate automatic smoke control sequences.
10. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
11. All electrically locked stairwell/exit doors shall unlock throughout the building.
12. All self-closing fire/smoke doors held open shall be released.

1.09 SUPERVISION

- A. Each independently supervised circuit shall include a discrete panel readout to indicate disarrangement conditions per circuit.

1.10 POWER REQUIREMENTS

- A. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24)] hours with 10 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
- B. All circuits requiring system operating power shall be 24VDC and shall be individually fused at the control panel.

1.12 MULTIPLE ADDRESSABLE PERIPHERAL NETWORK

- A. Communication with addressable devices: The system must provide communication with all initiating and control devices individually. All of these devices are to be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:
 1. Alarm
 2. Trouble
 3. Open
 4. Short
 5. Ground
 6. Device Fail/or Incorrect Device
- B. All addressable devices are to have the capability of being disabled or enabled individually.
- C. Up to 127 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.
- F. Format: The communication format must be a poll/response protocol to allow t-tapping of the wire to addressable devices and be completely digital. A high degree of communication

reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission protocol. Systems that do not utilize full digital transmission protocol (i.e. that may use time pulse width methods to transmit data etc.) will not be acceptable since they are considered unreliable and prone to errors.

- G. Identification of Addressable Devices: Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact.
- H. Wiring Type, Distances, Survivability and Configurations: Wiring types will be approved by the equipment manufacturer. Existing wiring will be utilized in retrofit applications. The system must allow up to 2,500 feet wire length to the furthest addressable device. Class A (Style 6 Signaling Line Circuit as defined by NFPA-72) communications will be provided where shown on the drawings. Wire will be so routed to maintain sufficient distance between the forward and return loop as called for by the Authority Having Jurisdiction (AHJ). To minimize wire routing and to facilitate future additions, t-tapping of the communications channel will be supported except where Class A wiring is required.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. EST(Edwards).
- B. Simplex.
- C. Notifier.
- D. Siemens.
- E. Approved Equal.

2.2 INTELLIGENT ANALOG SYSTEM SMOKE DETECTORS

- A. General Requirements for Intelligent Analog Detectors:
 - 1. Integral Microprocessor: All decision are made at the detector determining if the device is in the alarm or trouble condition.
 - 2. Non-Volatile Memory: Permanently stores serial number, and type of device.
 - 1. Automatically updates historic information including hours of operation, maintenance date, number of alarms and troubles, time of last alarm and analog signal patterns for each sensing element just before last alarm.
 - 4. Electronic Addressing: Permanently stores programmable system address. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable.
 - 5. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location and the device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.
 - 6. Sensitivity Range: Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. It shall be possible to automatically change the

sensitivity of individual analog/addressable detectors for the day and night periods. It shall be possible to program control panel activity to each level.

7. Pre-Alarm: Detector stores 20 pre-alarm sensitivity values to alert local personnel prior to the sensor reaching full evacuation sensitivity. Sensitivity values can be set in 5% increments.
8. Environmental Compensation: The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal when the detector reaches 75% (Dirty) to 99% (More Dirty) compensation has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.
9. Twin Status LEDs: Flashing Green LED shows normal; flashing RED shows alarm state; steady RED and steady GREEN show alarm state in stand-alone mode, visible from any direction.
10. UL Sensitivity Testing: The detector shall utilize a supervised microprocessor that is capable of monitoring the sensitivity of the detector. If the detector sensitivity shifts outside of the UL limits, a trouble signal is sent to the panel.
11. Device Replacement: The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

B. Intelligent 4D Multi-sensor Detector (Photo/Ion/Thermal and Time):

1. Provide intelligent analog addressable 4D multi-sensor smoke detectors at the locations shown on the drawings. The 4D Intelligent detector gathers analog information from each of its three fire sensing elements and converts it into digital signals. The detectors on-board microprocessor measures and analyzes these signals separately with respect to a fourth element – Time. It compares the information to historical readings, time patterns and known fire characteristics to make an alarm decision. Digital filters remove signal patterns that are not typical of fires.
2. Separately mounted combinations of photoelectric detectors, ionization detectors and heat detectors in the same location, clustered at the manufacturer's listed spacing is an acceptable alternative.

C. Intelligent 3D Multi-sensor Detector (Photo/Thermal and Time):

1. Provide intelligent analog addressable 3D multi-sensor smoke detectors at the locations shown on the drawings. The 3D Intelligent detector gathers analog information from each of its two fire sensing elements and converts it into digital signals. The detectors on-board microprocessor measures and analyzes these signals separately with respect to a third element – Time. It compares the information to historical readings, time patterns and known fire characteristics to make an alarm decision. Digital filters remove signal patterns that are not typical of fires.

D. Intelligent Photoelectric Detector:

1. Provide intelligent analog addressable photoelectric smoke detectors at the locations shown on the drawings.

E. Intelligent 135 Degree Fixed Temperature / Rate of Rise Heat Detector:

1. Provide intelligent combination fixed temperature/rate-of-rise heat detectors at the locations shown on the drawings.
2. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm.
3. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable.
4. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate-of-rise alarm point of 15°F (9°C) per minute.
5. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.

D. Fixed Temperature Heat Detector:

1. Provide intelligent fixed temperature heat detectors at the locations shown on the drawings.
2. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data.
3. Systems using central intelligence for alarm decisions shall not be acceptable.
4. The heat detector shall have a nominal alarm point rating of 135°F (57°C).
5. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.

E. Detector Base Types

1. Provide standard detector mounting bases suitable for mounting on 1-gang, or 4inch octagon box and 4 inch square box. The base shall, contain no electronics and support all series detector types. Bases with electronics or dip-switches are not acceptable.
2. Provide relay detector mounting bases suitable for mounting on 1-gang, or 4" octagon box and 4" square box. The relay base shall support all Signature Series detector types and have the following minimum requirements:
 - a. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.
 - b. The position of the contact shall be supervised.
 - c. The relay shall automatically de-energize when a detector is removed.
 - d. The operation of the relay base shall be controlled by its respective detector processor or under program control as required by the application. Detector relays not capable of operational programming independent of the detector shall not be considered equal. Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 Vdc and be listed for "pilot duty".
 - e. Removal of the respective detector shall not affect communications with other detectors.
3. Provide audible detector mounting bases suitable for mounting on 4" x 4" octagonal concrete ring (mud box) and 4" square x 2-1/8" (54 mm) deep box.
 - a. The base shall support all Signature Series detector types and be capable of single or group operation. The audible base shall emit a temporal alarm tone and be selectable for low or high output.

- b. The operation of the audible base shall be controlled by its respective detector processor or under program control as required by the application. Detector audible base not capable of operational programming independent of the detector shall not be considered equal.
- c. The audible bases shall be UL268 and UL464 Listed, and provide a reverberant room sound output per UL464 of 81 dBA at 10ft (3m). and an average anechoic sound output of 90 dBA at 10 ft. (3m).

F. Intelligent Duct Smoke Detector – Photoelectric:

- 1. Provide intelligent photoelectric duct smoke detector at the locations shown on the drawings.
 - a. One form C auxiliary alarm relay rated at 2amps @ 30Vdc.
 - b. The operating range shall be 100ft/min to 4,000ft/min air velocity and temperature range of -20 to 158F.
 - c. Sample tube can be installed with or without the cover plate and be rotated in 45- degree increments to ensure proper alignment with duct airflow.
 - d. Local magnet-activated test switch.
- 2. Provide remote test station with Alarm LED and Key Switch.
- 3. Relay Fan Shutdown: Rated to interrupt fan motor control circuit. Furnish and install separate device for each motor start. Connect to motor start as required for fan shutdown during alarm condition.

2.3 INTELLIGENT MODULES

- A. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller.
 - 1. Integral Microprocessor: All decisions are made at the module determining if the device is alarm or trouble condition.
 - 2. Non-Volatile Memory: Permanently stores serial number, and type of device. Automatically updates historic information including hours of operation, number of alarms and troubles, time of last alarm.
 - 3. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location. The device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.
 - 4. Twin Status LEDs: The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status.
 - 5. Input and output circuit wiring shall be supervised for open and ground faults.
 - 6. Two styles of modules shall be available; those designed for gang box mounting, and where multiple modules are required in a single location, plug in modules shall be provided with a Universal Input/Output motherboard.
- B. Intelligent Input Module. The Input Module shall provide one or two supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes

and 1 ½” (38mm) deep 4” square boxes with 1-gang covers. The single input module shall support the following circuit types:

1. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
 2. Normally-Open Alarm Delayed Latching (Water flow Switches)
 3. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
 4. Normally-Open Active Latching (Supervisory, Tamper Switches)
- C. Intelligent Relay Module. Provide addressable control relay circuit modules shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on North American 2 ½” (64mm) deep 1-gang boxes and 1 ½” (38mm) deep 4” square boxes with 1-gang covers.
- D. NAC Control Module: Provide intelligent NAC control module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. The gang box -mounted version shall be suitable for mounting in North American 2 ½” (64mm) deep 2-gang boxes and 1 ½” (38mm) deep 4” square boxes with 2-gang covers, or European 100mm square boxes. The plug-In version shall plug into a universal multi-module motherboard. The NAC control module shall support the following operations:
1. 24volt NAC circuit
 2. Audio notification circuit 25v or 70v
 3. Telephone Power Selector with Ring Tone (Firefighter’s Telephone)
 4. Visual Synchronized Output to Genesis appliances or to NAC Power Supply.
- E. FA Elevator Interface Cabinet
1. Provide red metal cabinet enclosure with word FIRE in white letters on the cover. Inside will be four intelligent relays (Primary Recall, Alternate Recall, Fire Hat and Shunt Trip), one monitor input (Shunt Trip AC Power Supervision) and 120vac relay (Shunt Trip AC Power Supv).
 2. Label all the relays and input modules for the function.
- 2.4 NOTIFICATION APPLIANCES
- A. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers’ instructions.
- B. Any appliances, which do not meet the above requirements, and are submitted, for use must show written proof of they're compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended. All appliances shall be UL listed Fire Protective Service. and shall be UL 1971.
- C. Notification Appliances – Visual:
1. Provide wall or ceiling mounted white strobes with in-out screw terminals shall be provided for wiring. Strobes shall provide a smooth light distribution pattern field selectable candela 15 cd, 30 cd, 75 cd, and 110 cd flash output rating.

2. The strobe (15, 30, 75, 110) candela rating shall be view from the side window to verify the setting.
3. All strobes shall be synchronization to within 10 milliseconds for an indefinite period shall not require the use of separately installed remote synch modules.
4. The strobes shall mount to one-gang electrical box. The device shall have plastic protective cover for during installation.
5. The actual candela setting on the visual shall be marked on the appliance.

D. Notification Appliance – Horn:

1. Provide low profile wall mount horns at the locations shown on the drawings. The horn shall provide an 95 dBA sound output at 10 ft. when measured in reverberation room per UL-464. The horn shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. The horn shall mount in a 1-gang box.
2. The device shall have plastic protective cover for during installation.

E. Notification Appliance – Horn/Strobe:

1. Provide low profile wall mount horn/strobes at the locations shown on the drawings. The horn/strobe shall provide an audible output of 95 dBA at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs.
2. The strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd & 110cd devices. The horn shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring.
3. Low profile horn/strobes shall mount to one-gang box.
4. The device shall have plastic protective cover for during installation.

F. Notification Appliance – Harsh Environment Temporal Horn/Strobes:

1. Provide red electronic horn/strobes at the locations shown on the drawings. Horns shall be temporal output. At the high output setting, the horn shall provide a 85 dBA continuous sound output or a 95 dBA temporal sound output, when measured in reverberation room per UL-464. Strobes shall provide 15 cd, 75 cd, 110 cd synchronized flash outputs without the use of separate “synchronizing” modules. The strobe shall have lens markings oriented for wall or ceiling mounting.
2. In - Out screw terminals shall be provided for wiring. Horns shall mount to a North American 4” electrical boxes (2-1/8” deep) or to a 2-gang (2-3/4” deep) electric box. Weatherproof wall boxes shall be provided for outdoor applications.
3. Provide GE-EST model 757 series.

2.5 GUARDS FOR PHYSICAL PROTECTION

- A. Provide welded mesh of size and shape for the manual pull stations, smoke detectors, notification appliances at location noted on the drawings.

2.6 INSPECTION BAR CODES

- A. Inspection bar codes shall be installed on all initiating devices, annunciators, control panels and power supplies.
- B. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format, and contain a minimum of eight (8) digits that comprise a unique serial identifier within the

Web-based Reporting System. There shall be no duplication of serial numbers. Serial number shall be printed below the bar code for identification purposes.

- C. Inspection bar codes shall be limited in size to no more than 2" (5cm) in width, and 3/8" (2 cm), in height and shall include a Mylar[®] or other protective coating to protect the bar code from fading due to sunlight or exposure.
- D. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code take place no further than 12" from the device during inspection.

2.7 WIRE AND CABLE

- A. Signaling Line Circuits – Network Data: Twisted pair, not less than No. 18Awg or as recommended by the manufacturer.
- B. Signaling Line Circuits – Intelligent Loop: Twisted pair, not less than No. 18Awg or as recommended by the manufacturer.
 - 1. Circuit Integrity Cable: Provide as required to meet NFPA or Local Code requirements.
 - 2. CI Cable shall meet article 760, power limited fire alarm service.
- C. Notification Appliance Circuits –
 - 1. Horn and Visual. 12 AWG THHN or FPLP or as recommended by the manufacturer.
- D. All low voltage cable and wire shall be supplied and installed in accordance with the National Electrical Code and other provisions of Division 16000.
- E. Cable and wire selected for each application shall be in strict accordance with the original equipment manufacturers recommendations.
- F. All cables and wires shall be permanently tagged at both ends for ease in maintenance.

PART 3 – EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
- B. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.
- C. Smoke- or Heat-Detector Spacing:
 - 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 - 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.

5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
- D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
 - E. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
 - F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
 - G. Notification Appliance Devices: Install between 80 and 96 inches on the wall.
 - H. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.
 - I. Annunciator: Install with top of panel not more than 56 inches above the finished floor.
 - J. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.
 - K. Annunciator: Install with top of panel not more than 56 inches above the finished floor.

3.2 CABLE WIRING

- A. Cable shall be the type listed for the use as specified under NEC Article 760-30 (bell wire, intercom, or telephone wire are not approved).
 1. All cable shall be installed as per NEC Article 760.
 2. Leave 8-inch wire tails at each device box and 36-inch wire tails at the Fire Alarm Control Panel.
 3. Cable for conventional initiating devices shall be looped by zone. Cable shall be installed from the Monitor Module to the first device, then to each succeeding device within each zone loop. An end-of-line resistor device shall be installed at or after the last device on the circuit.
 4. Cable for conventional indicating devices (audible or visual) shall be looped as stated above from the Control Module. An end-of-line resistor device shall be installed at or after the last device on the circuit. Wire may be 16 through 12 AWG.
 5. Cable for SLC loops shall be 18 to 12 AWG twisted pair with a shield jacket. Shield continuity must be maintained and connected to earth ground only at the control panel. Intelligent detector wiring must not be routed adjacent to, or in the same conduit with Audio/Visual power wiring, 120/240 VAC power wiring or other high current circuits.
 6. T-Taps or branch circuit connections are allowed for all Style 4 intelligent loop circuits.
 7. Cable for RS-232c devices (CRT, Printer) shall be dual pair twisted-shielded.
 8. Power wiring shall be 12 AWG.

3.3 DEVICE BOX MOUNTING

- A. Device Box Mounting: Unless otherwise noted on the drawings, plans, specification or by the Engineer; the recommended mounting heights, type of boxes required and other specific requirements are as follows:
1. Fire Alarm Control Panel(s): Mount with center of panel at least 60 inches above floor level. Install 120 VAC wiring with green ground wiring on a dedicated separate circuit, maximum 20 amperes. Use only identified conduit entries, or request approval for other penetrations in cabinets, (certain areas require clear space for interior components). Cabinet shall be grounded to either a cold water pipe or grounding rod.
 2. Magnet Door Holder(s): Wall type require a 1-gang box. Note: See individual instruction sheet of particular device being used for the exact location of box or stub.
 3. Signaling Device(s): Standard semi-flush horns, bells and chimes require a 4 inch square, 2-1/8 inch deep, device box with a 2-gang ring (1/2" minimum depth). Install 6" below finished ceiling or 120" maximum height.
 4. Weatherproof horns, bells or chimes are generally surface mounted and require a 3/4" conduit nipple or fitting threads only to protrude 1/2" from finished wall surface. When entering the back of the box is not practical, then side entry may be accomplished by using 1/2" conduit.
 5. Manual Stations: Install a 4" square device box (2-1/8" minimum depth) at 48" center above finished floor. All Manual Stations shall be in unobstructed locations.
 6. Heat and Smoke Detector(s): The location of detectors shown on the plans is schematic only. The detectors must be located according to code requirements.
 7. Detectors require a 4" square device box with a 3/0 ring. They should be located on the highest part of a smooth ceiling so that the edge of the detector is no closer than 4 inches from a sidewall. Ceilings with beams, joists or soffits that exceed 8" in depth require special planning and closer spacing. Install as instructed by manufacturer of device(s).
 8. If it is necessary to mount a detector upon a sidewall, the top of the detector shall be located no closer than 4" from the ceiling and no further away than 12".
 9. Smoke detectors should be installed to favor the airflow towards return openings and not located where air supply diffusers can dilute smoke before it reaches the detector.
 10. Ideally, heat and smoke detectors should be located near the center of the open area which they are protecting, thus providing coverage generally for a 15 foot radius for smoke detectors and a 25 foot radius for heat detectors. Install as directed by Architect or Engineer.
 11. Duct Smoke Detectors: Surface mounted housing which is normally installed upon the side or top of the composite return and/or supply air duct. Air sampling tubes protrude from the rear of the unit, one of which entirely spans the widest portion of the duct. Note: See individual instruction sheet of device being used for exact location and mounting.
 12. Sprinkler Waterflow and Gate-Valve Switch: Install a 4" square device box on a wall accessibly and centrally located near the switch and use 1/2" flex to connect each device to the box. Exterior mounted devices on post-indicator valves and in pits, etc., require liquid-tight flex and weatherproof boxes and fittings for all wiring.
 13. Where new devices are mounted at existing locations, provide painted back-up plates to provide a finished appearance.

3.4 FIELD QUALITY CONTROL

- A. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.
- B. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.

- C. All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.
- D. The system including all its sequence of operations shall be demonstrated to the Owner, his representative, and the local fire inspector. In the event the system does not operate properly, the test shall be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to the Owner, his representatives and the fire inspector.
- E. At the final test and inspection, a factory trained representative of the system manufacturer shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision, and participate during all of the testing for the system.
- F. All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 - 1999, Chapter 7.
- G. A letter from the Contractor certifying that the system is installed entirely in accordance with the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.

3.5 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 8 Section "Door Hardware."
Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - 2. Alarm-initiating connection to elevator recall system and components.
 - 3. Alarm-initiating connection to activate emergency lighting control.
 - 4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 5. Supervisory connections at valve supervisory switches.
 - 6. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 7. Supervisory connections at elevator shunt trip breaker.

3.6 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
- B. Install framed instructions in a location visible from fire-alarm control unit.

- C. All initiating devices shall have bar code label installed visibly on the device. This bar code shall be used for digital inspection of the fire alarm system using Building Reports.Com.

3.7 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.8 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Architect, Engineer and authorities having jurisdiction.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections. Prepare test and inspection reports.

- G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- H. Annual Test and Inspection: During the warranty period, each year test fire-alarm system complying with visual and testing inspection requirements in NFPA72. Use forms developed for initial tests and inspections.
- I. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicated a devices trouble. A copy of UL letter is to be provided as proof of system operation

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

3.10 BASIC OPERATOR TRAINING

- A. Provide operator training for two (2) persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Training shall be performed at the project site provided by the Owner.
- B. Installation Contractor and equipment vendor shall provide all training materials, testing equipment, and demonstration aids required to provide operator, supervision, and maintenance personnel training. At completion of the training period, all training brochures, bulletins, manuals, handbooks, and diagnostic guidelines shall remain with the Owner.

END OF SECTION

SECTION 31 22 00

SITE PREPARATION AND EARTHWORK

PART 1 - GENERAL

1.01 Section Includes

- A. Clearing site of debris, grass, trees and other plant life in preparation for construction.
- B. Protection of existing structures, trees or vegetation to remain.
- C. Stripping of topsoil from areas to be incorporated into the work.
- D. Excavation, filling and compaction for site grading and paved surface subgrade preparation.

1.02 References

- A. ASTM D 1557 - Standard Test Methods Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- B. ASTM D2487 - Classification of Soils for Engineering Purposes.
- C. ASTM D2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- D. ASTM D3017 - Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.03 Submittals

- A. Submit compaction test reports.

PART 2 - PRODUCTS

2.01 Materials

- A. Common Fill: On-site or off-site natural soil free from organic matter, debris, vegetation, stones larger than 6" and frozen material and classified in ASTM D2487 as follows:
 - GW - Well-graded gravels, gravel-sand mixtures, little or no fines.
 - GP - Poorly-graded gravels, gravel-sand mixtures, little or no fines.
 - GM - Silty gravels, gravel-sand-silt mixtures.
 - GC - Clayey gravels, gravel-sand-clay mixtures.
 - SW - Well-graded sands, gravelly sands, little or no fines.
 - SP - Poorly-graded sands, gravelly sands, little or no fines.
 - SM - Silty sands, sand-silt mixture.
 - SC - Clayey sands, sand-clay mixtures.
 - ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
 - CL - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.

- B. Breaker Run: Crushed stone meeting the following gradation:

5-Inch Breaker Run	
Sieve Size	% Passing by Weight
5 inch	90 - 100
1-1/2 inch	20 - 50
No. 10	0 - 10

3-Inch Breaker Run	
Sieve Size	% Passing by Weight
3 inch	90 - 100
1-1/2 inch	60 - 85
3/4 inch	40 - 65
No. 4	15 - 40
No. 10	10 - 30
No. 40	5 - 20
No. 200	2 - 12

- C. Geotextile: A geotextile fabric woven from polyester or polypropylene. The geotextile shall be insect, rodent, mildew, rot, and UV resistant. The geotextile shall have the following minimum requirements:

Geotextile Properties		
Property	Test Method	Requirement*
Grab Tensile Strength, lbs.	ASTM D4632	200
Elongation, %	ASTM D4632	15
Puncture, lbs.	ASTM D4833	120
Trapezoidal Tear, lbs.	ASTM D4533	80

*Minimum average roll value

Mirafi 500X, TenCate Geosynthetics; 80EX, Thrace-LINQ, Inc; Soiltex ST205N, Geo-Synthetics, Inc. or equal.

PART 3 - EXECUTION

3.01 Protection

- A. Locate and identify existing utilities that are to remain and protect them from damage.
- B. Protect trees, plants, structures, site improvements and features designated to remain.
- C. Protect bench marks, property corners and other survey monuments from damage or displacement.

3.02 Clearing

- A. Clear area within the clearing limits shown on the Drawings. If no clearing limits are shown, clear five feet outside of the grading limits, but not beyond project property boundaries.
- B. Remove trees, saplings, shrubs, bushes, vines and undergrowth within the clearing limits to the height above ground as follows:
 1. Trees over six inch diameter; six inches.
 2. Trees, shrubs and bushes under six inch diameter; three inches.
 3. Vines and undergrowth; two inches.

3.03 Grubbing

- A. Remove all stumps, main root balls and root systems to the minimum depths indicated:
 1. Beneath footings: 18 inches.
 2. Beneath paved roads, parking areas and walks: 12 inches below sub-grade.
 3. Beneath turf: 8 inches.
 4. In fill areas: 12 inches.

3.04 Topsoil Excavation

- A. Cut heavy growths of grass from areas to be stripped.
- B. Strip topsoil from all areas to be excavated, regraded or landscaped to a depth that prevents the intermingling of the topsoil with the subsoil.
- C. Topsoil is defined as surficial soil containing organic matter that sustains plant life.

- D. Stockpile the stripped topsoil on the site for reuse. If stockpile location is not shown on the Drawings, coordinate the location with the Engineer.
- E. Provide erosion protection for all stockpiled topsoil.

3.05 Pavement Removal

- A. Remove existing pavement and dispose of off-site. Removal of pavement will be considered incidental to the work unless indicated otherwise.
- B. Provide a straight saw cut joint between pavement being removed and pavement to remain. Use power saw for cutting. Steel disk cutters mounted on power shovel bucket are not acceptable.

3.06 Lines and Grade

- A. Streets
 1. Construct the finish subgrade to the line, grade, and cross section as shown on the Drawings.
 2. The Engineer will provide grade stakes at a minimum distance of 50 feet along the centerline. Provide Engineer with a minimum of 48 hours notice of the need for grade stakes.
 3. Contractor may use slope meters or GPS type controls on machines for grade control. However, the contractor is responsible for verifying the finish grade elevations with a level at a minimum of every 50 feet along the centerline.
- B. Site Grading
 1. Construct the finish subgrade to contours shown on the Drawings.
 2. The Engineer will provide grade stakes as appropriate for the Work.
 3. Contractor may use slope meters or GPS type controls on machines for grade control. However, the contractor is responsible for verifying the finish grade elevations.

3.07 Grading and Subgrade Preparation

- A. Cut and fill to the required grades and cross section and contours.
- B. Scarify surface of cut areas and compact to the degree required for subsequent backfill.
- C. Place fill material in continuous layers not exceeding 8" compacted thickness.
- D. For proposed streets and parking lots, roll the surface with a steel drum roller to provide a relatively impervious surface where additional filling or excavation is necessary or placement of base course will be delayed.
- E. Maintain surface drainage during construction.
- F. Remove excess material from site. If borrow is needed, provide material meeting requirements of 2.01 for common fill.
- G. Grading contractor shall grade roads and other surfaces to be paved to rough subgrade elevation prior to installation of utilities. After utility installation, the grading contractor shall grade to finish subgrade elevation.
- H. Prior to placement of topsoil, areas that have been compacted by construction traffic shall be scarified to a minimum depth of 12 inches using a chisel plow or ripper arms on a dozer. Scarifying shall be performed along the contour.

3.08 Compaction

- A. Adjust moisture content of fill material to accomplish the required degree of compaction.
- B. Use a sheepfoot roller for cohesive soils and a smooth drum vibratory roller for granular soils.
- C. Compact to the percent of maximum dry density as listed below in accordance with ASTM D1557.

Compaction Requirements		
Area	Cohesive Soils	Granular Soils
Beneath Turf	85%	85%
Beneath Walks & Curbs	90%	95%
Beneath Paving	90%	95%
Building Pad Area	90%	95%
Storm Water/Treatment Pond Berms	90%	95%

3.09 Proof Rolling

- A. Proof roll the finished pavement subgrade in the presence of the Engineer. Provide 24-hour notice to the Engineer as to when the proof-rolling will be performed.
- B. Prior to proof rolling, the entire roadway subgrade shall have a relatively smooth surface, suitable for observing soil reaction during proof rolling.
- C. Provide a loaded tri-axle dump truck with a minimum gross weight of 30 tons.
- D. Proof rolling shall be accomplished in a series of traverses parallel to the centerline of the street or parking area. The truck shall traverse the length of the street or parking area once for each 12 feet of width. Additional passes may be directed by the Engineer.
- E. Soft areas, yielding areas, cracked areas, or areas where rolling or wave action is observed shall be considered indicative of unsatisfactory subgrade. Such areas shall be undercut, replaced with suitable fill material, and recompacted.
- F. Once the subgrade has been proof rolled and approved, protect the soils from becoming saturated, frozen, or adversely affected.

3.10 Subgrade Stabilization

- A. If ordered by the Engineer or if indicated in the Contract Documents, subgrade material that cannot be adequately compacted shall be removed and replaced with breaker run material and/or geotextile.
- B. The depth of the undercut, breaker run size, and/or geotextile requirement will be at the discretion of the Engineer.
- C. Unless otherwise indicated within the contract documents, subgrade stabilization with breaker run material will be paid for by the in-place cubic yard including excavation, furnishing and placement of breaker run material, and disposal of undercut material.

3.11 Geotextile Placement

- A. Clear area of sharp objects, stumps, and large stones that would puncture geotextile.
- B. Roll geotextile onto the subgrade by hand in the longitudinal direction. Overlap adjacent strips two feet.
- C. Back-dump aggregate onto the geotextile beginning at a point just before the fabric and on firm soil. No vehicular traffic will be allowed directly on the geotextile. Spread the aggregate with a bulldozer. The first lift shall be as thick as possible to prevent over-stressing of the subgrade.
- D. Take care during aggregate placement to prevent damage to the geotextile. Repair damages or tears by placing a piece of geotextile over the damaged area. Overlap the repair piece onto the undamaged area a minimum of three feet.
- E. Compaction: Perform initial compaction with bulldozers while spreading. Perform final compaction with a vibratory compactor, first without vibration for several passes, followed with vibration. Do not grade down ruts; fill with additional aggregate and compact.

3.12 Tolerances

- A. Top Surface of Road Subgrade:
 - 1. Rough Grade: Plus or minus 0.25 ft.
 - 2. Finish Subgrade: Plus or minus 0.05 ft.
- B. Top Surface of General Grading: Plus or minus 0.1 ft.

3.13 Field Quality Control

- A. Field inspection will be performed by an authorized representative of the Owner.
- B. Contractor is responsible for meeting the compaction requirements. The Contractor shall hire and pay for an independent testing firm to perform compaction tests to confirm the in-place density.
- C. For general grading perform one test per 9,000 square yards or part thereof of fill placed per lift. In addition, perform one test per building lot where fill is placed. For streets perform one test per 1,000 square yards or part thereof of fill placed per lift. Engineer or Owner's Representative will direct location of tests.
- D. Additional tests may be required if compaction requirements are not being met. The cost of these additional tests are the responsibility of the Contractor.
- E. Determination of moisture content shall be in accordance with ASTM D3017. Determination of density shall be in accordance with ASTM D2922.

3.14 Disposal

- A. Dispose of all plant material off-site at a location meeting state landfill requirements.
- B. Burning at the site will not be permitted.
- C. Dispose of excess soil materials or unsuitable material off-site unless on-site disposal is indicated, or approved by Owner.

END OF SECTION

SECTION 31 23 33

UTILITY EXCAVATION, BACKFILLING AND COMPACTION

PART 1 – GENERAL

1.01 Section Includes

- A. Excavation of trenches for below grade piping and conduit.
- B. Backfilling and compaction

1.02 References

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregate.
- B. ASTM D1557 - Standard Test Methods Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m^{3- C. ASTM D2487 - Classification of Soils for Engineering Purposes.}

1.03 Submittals

- A. Submit 50 lb. sample of off-site backfill materials.
- B. Submit gradation of select granular backfill.

PART 2 – PRODUCTS

2.01 Materials

- A. Crushed Stone: Hard, durable particles of crushed stone or gravel substantially free from shale or lumps of clay or loam meeting the following gradation:

Crushed Stone Gradation	
Sieve Size	% Passing By Weight
2 Inch	100
1-1/2 Inch	90 - 100
1 Inch	35 - 70
3/4 Inch	0 - 15
1/2 Inch	0 - 5

- B. Trench Backfill: Natural soils, free of organic matter, trash, deleterious materials, stones larger than eight inches and frozen material and classified in ASTM D2487 as follows:

GW - Well-graded gravels, gravel-sand mixtures, little or no fines.
GP - Poorly-graded gravels, gravel-sand mixtures, little or no fines.
GM - Silty gravels, gravel-sand-silt mixtures.
GC - Clayey gravels, gravel-sand-clay mixtures.
SW - Well-graded sands, gravelly sands, little or no fines.
SP - Poorly-graded sands, gravelly sands, little or no fines.
SM - Silty sands, sand-silt mixture.
SC - Clayey sands, sand-clay mixtures.
ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
CL - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.

Soils classified in ASTM D2487 as follows are not acceptable:

OL - Organic silts and organic silty clays of low plasticity.
MH - Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
CH - Inorganic clays of high plasticity, fat clays.

OH - Organic clays of medium to high plasticity, organic silts.
 Pt - Peat and other highly organic soils.

- C. Select Granular Backfill: Durable particles ranging from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids of the coarse material. Some fine clay or loam particles are desirable, but they shall not be present in the form of lumps. Granular backfill shall conform to the following gradation:

Granular Backfill Gradation	
Sieve Size	% Passing By Weight
3 Inch	100
2 Inch	95 - 100
No. 4	35 - 60
Finer than No. 200	5 - 15

- D. Bedding: See individual specification sections.

PART 3 – EXECUTION

3.01 Examination

- A. Verify fill materials to be used are acceptable.

3.02 Preparation

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining which pass through work area.
- C. Protect plant life, lawns, and other features remaining as a portion of the final landscaping.
- D. Protect benchmarks and existing features from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.
- F. Strip topsoil and stockpile on-site for reuse.
- G. When excavating across or within existing pavement, saw cut in neat straight lines.

3.03 Minor Trench Water

- A. Do not allow water to accumulate in the trench.
- B. Provide all equipment needed to accomplish the Work. Unless indicated otherwise, no additional compensation will be made for removing trench water.
- C. No additional compensation will be made for crushed stone used for trench drainage.
- D. Dispose of water in a suitable manner, and in accordance with regulations of the Wisconsin Department of Natural Resources, without damage to property.

3.04 Excavation

- A. Excavate subsoil to required depth and grade.
- B. Cut trenches sufficiently wide to enable installation of the utilities and allow inspection. Normal trench width below the top of the pipe shall be the nominal pipe diameter plus 24 inches.
- C. Do not undercut trench walls.
- D. Trench walls more than five feet in depth shall be shored, cut back to stable slope or provided with equivalent means of protection in accordance with the applicable rules of the Department of Labor, Occupational Safety and Health Administration (OSHA). Provide a ladder for trench exit in trenches

over four feet deep.

- E. Excess excavation below the required level shall be backfilled with crushed stone at the Contractor's expense.
- F. If the trench bottom is unstable due to soil material or groundwater conditions, an additional 3 inches shall be excavated and backfilled with crushed stone as specified in Part 2. There will be no extra payment for the additional excavation and stone. If it is necessary to excavate to a greater depth to provide a stable trench, the Contractor will be paid for the additional excavation and stone, if the extra excavation was ordered by the Engineer or approved by the Engineer prior to the work being performed.
- G. Remove ledge rock, boulders or large stones to provide a minimum clearance of 6 inches between the pipe and the rock. See Section on Rock Excavation, if included.
- H. Not more than 100 feet of trench shall be open ahead or behind the pipe laying. Additional trenching will not be allowed if earlier trenches have not been backfilled or if the trench surfaces are unsatisfactory.
- I. Utility contractor is responsible for the disposition of excess material resulting from the utility construction. Stockpile excess excavated material in areas designated on the Drawings. If stockpile areas are not designated on the Drawings, dispose of the material offsite.

3.05 Backfilling

- A. Backfill trenches with excavated material meeting the requirements for backfill specified in Part 2 above. Use select granular backfill only when indicated on the Drawings or elsewhere in the Project Manual.
- B. Backfill trenches to the rough subgrade elevation, plus or minus 0.25 ft.
- C. Place material in continuous layers not exceeding 8 inches compacted thickness. Compact each layer to the percent of maximum dry density as listed below in accordance with ASTM D1557.
- D. Compaction Requirements: Meet the following compaction requirements:

Compaction Requirements		
Area	Cohesive Soil	Granular Soil
Beneath Turf	85%	85%
Beneath Structures	90%	95%
Beneath Paving	90%	95%

- E. Maintain moisture content of backfill materials to attain required compaction density.

3.06 Restoration

- A. Remove excess excavation immediately after completion of backfilling.
- B. If site restoration is required, commence immediately after backfilling is completed.
- C. Maintain roadways in a driveable condition, acceptable to the Engineer, prior to pavement restoration.

3.07 Field Quality Control

- A. Field inspection will be performed by an authorized representative of the Owner.
- B. Contractor is responsible for meeting the compaction requirements. The Contractor shall hire an independent testing firm to perform compaction tests to confirm the in-place density.
- C. Testing Requirements: Four tests at various depths per 400 feet of trench. Engineer or Owner's Representative will direct the location of the tests.
- D. Additional tests may be required if compaction requirements are not being met. The cost of these

additional tests are the responsibility of the Contractor.

- E. Determination of moisture content shall be in accordance with ASTM D3017. Determination of density shall be in accordance with ASTM D2922.

END OF SECTION

SECTION 31 37 16

RIPRAP

PART I - GENERAL

1.01 Section Includes

- A. Furnishing and placing of stone riprap.
- B. Geotextile.

1.02 References

- A. ASTM D4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles.
- B. ASTM D4751 - Test Method for Determining Apparent Opening Size of a Geotextile.
- C. ASTM D4833 - Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
- D. State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition (WIDOT).

1.03 Submittals

- A. Submit gradation for each riprap size to be used for the Work.

PART 2 - PRODUCTS

2.01 Materials

- A. Riprap: Durable field stone or quarry stone, sound, hard and free from seams or cracks. Stones shall be generally round or cubiform in shape with a weight of approximately 165 lbs/cf. Slabby or elongated pieces having a width or thickness less than one-third the length shall not exceed ten percent of the total. The riprap shall conform to the following gradations:

Gradation - Diameter in Inches				
Class	D _{Max}	D ₅₀	D _{Min}	WIDOT Equiv. Riprap
1	6	3	2	- - -
2	12	6	3	Light
3	18	9	5	Heavy
4	24	12	7	Extra Heavy

- B. Geotextile: A nonwoven fabric consisting of polypropylene, polyethylene, or polyamide. Fabric shall be resistant to insects, rodents, mildew and rot, and protected from UV degradation. Fabric shall meet the following minimum values:

Geotextile Requirements			
Property	Test Method	Requirements*	
		Riprap Class 1 & 2	Riprap Class 3 & 4
Grab tensile strength, lbs. min.	ASTM D4632	205	300
Elongation, percent min.	ASTM D4632	50	50
Puncture strength, lbs	ASTM D4833	500	800
Max. Apparent opening size, US Sieve	ASTM D 4751	No. 80	No. 100

*Typical or average values

PART 3 - EXECUTION

3.01 Geotextile Placement

- A. Provide geotextile as required for the class of riprap to be installed.
- B. Remove stones or sharp objects from the subgrade that could damage the geotextile.
- C. Unroll geotextile directly on the prepared surface.
- D. Overlap adjacent sides and ends a minimum of two feet.
- E. Toe-in geotextile at top and bottom of slope.

3.02 Riprap Placement

- A. Use riprap class indicated on Drawings.
- B. Place riprap from bottom to top.
- C. Provide a uniform distribution of the various size stones to produce a well-keyed mass.
- D. Place to the depth indicated on the Drawings.
- E. Do not drop stones from a height greater than one foot.

END OF SECTION

SECTION 32 11 23

CRUSHED AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 Section Includes

- A. Furnishing and placing crushed aggregate base course as a foundation for asphaltic concrete pavement or Portland cement concrete pavement.

1.02 References

- A. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregate.
- B. ASTM D1557 - Standard Test Methods Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- C. Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition (WisDOT).

1.03 Submittals

- A. Submit aggregate gradation; ASTM C136.
- B. Submit truck weight slips. Include as a minimum, truck number, date, time, gross weight, tare weight and net weight.

PART 2 - PRODUCTS

2.01 Crushed Aggregate

- A. Meet material requirements of WisDOT.
- B. Gradation
 - 1. Except for reclaimed asphaltic pavement, conform to the gradations listed in the following table:

Sieve Size	Percentage Passing By Weight		
	3-Inch Base	1 1/4-Inch Base	3/4-Inch Base
3-Inch	90 - 100	---	---
1 1/2-Inch	60 - 85	---	---
1 1/4-Inch	---	95 - 100	---
1-Inch	---	---	100
3/4-Inch	40 - 65	70 - 93	95 - 100
3/8-Inch	---	42 - 80	50 - 90
No. 4	15 - 40	25 - 63	35 - 70
No. 10	10 - 30	16 - 48	15 - 55
No. 40	5 - 20	8 - 28	10 - 35
No. 200	2 - 12	2 - 12 ^{a, c}	5 - 15 ^b

- a. Limited to a maximum of 8 percent in base course placed between new and old pavement.
- b. 8 - 15 percent passing when base is \geq 50% crushed gravel.
- c. 4 - 10 percent passing when base is \geq 50% crushed gravel.
- 2. Use 1 1/4-Inch Base in top 4 or more inches of base. Use 3-Inch Base or 1 1/4-Inch Base in the lower base layers.
- 3. Use 3/4-Inch Base in the top 3 inches of unpaved portion of the shoulder. Also, if using 3-Inch Base in the lower base layers, use 3/4-Inch Base in the top 3 inches of the shoulder foreslopes. Use 3/4-Inch Base or 1 1/4-Inch Base elsewhere in shoulders.

2.02 Reclaimed Asphaltic Pavement

- A. If Contract Documents allow reclaimed asphaltic pavement, the material shall conform to the following:
 - 100 percent passing a 1 1/4-inch sieve.
 - 75 percent or less passing a No. 4 sieve.
 - Asphalt content between 3 and 6.5 percent.

PART 3 - EXECUTION

3.01 Preparation

- A. Check subgrade for conformity with grade and cross section.
- B. Remove depressions and ruts that may have been caused after subgrade completion.
- C. Proof-roll subgrade prior to placing aggregate with a loaded tandem-axle dump truck under the observance of the Engineer. Subgrade shall not rut or displace significantly under the weight of the loaded truck. Soft or unstable areas that cannot be improved by additional compaction shall be undercut, replaced with suitable fill material, and recompacted.

3.02 Lines and Grade

- A. Construct the base course to the line, grade and cross section as shown on the Drawings or as directed by the Engineer.
- B. For streets without curb and gutter, the Engineer will provide grade stakes at a minimum distance of 50 feet along the centerline. For streets with curb and gutter, the Engineer will stake the curb and gutter and will provide centerline cuts and fills from the curb stakes. Provide Engineer with a minimum of 48 hours notice of the need for grade stakes.
- C. Contractor may use slope meters or GPS type controls on machines for grade control. However, the contractor is responsible for verifying the finish grade elevations with a level at a minimum of every 50 feet along the centerline.

3.03 Equipment

- A. The weight, type, capacity and method of operation of all hauling and spreading equipment shall be appropriate for the work and shall not damage the subgrade or previously laid base course. Spreading equipment shall be designed and operated to spread the material in uniform layers without significant segregation.
- B. Motor graders used for mixing and shaping shall have weight, rigidity and design suitable for the work.
- C. Compaction equipment shall be of the rolling type, vibratory type or combination thereof. Tamping rollers shall exert a weight of not less than 150 pounds per square inch of tamping surface on each tamping foot in a transverse row. Pneumatic-tire rollers or other equipment shall have a weight of not less than 150 pounds per linear inch of overall rolling width.

3.04 Placing Base Course

- A. Place material in a manner to minimize segregation and to facilitate spreading in a uniform layer.
- B. Place material in maximum 6-inch thick compacted layers. If material is placed in more than one layer, each layer shall be approximately the same thickness.
- C. Compact each layer to 95 percent of the maximum dry density in accordance with ASTM D1557. If material is deficient in moisture content for readily attaining the required density, moisten the material as necessary.
- D. All material placed on the subgrade or previous layer shall be spread, shaped and compacted on the same day.

3.05 Tolerances

- A. Smoothness: Maximum variation of 3/8 inch when measured with a 10-foot straight edge.
- B. Compacted Thickness: Plus or minus 1/4 inch.

3.06 Proof Rolling

- A. Proof roll the completed base course with a loaded tandem-axle dump truck. The surface shall not rut, displace, or roll under the weight of the loaded truck. Soft or unstable areas that cannot be improved by additional compaction shall be replaced and recompacted. Proof rolling shall be done in the presence of the Engineer.

3.07 Field Quality Control

- A. Contractor is responsible for meeting the compaction requirements. The Engineer or authorized representative of the owner has the option to require the Contractor to hire an independent testing firm, at the Contractor's expense, to perform compaction tests to confirm the in-place density.
- B. Field inspection will be performed by the Engineer or an authorized representative of the Owner.
- C. Determination of moisture content shall be in accordance with ASTM D3017. Determination of density shall be in accordance with ASTM D2922.
- D. If tests indicate the work does not meet the specified requirements, remove and replace the work.

END OF SECTION

SECTION 32 12 16

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 Section Includes

- A. Construction of a one or two course asphaltic concrete pavement to the thickness and cross-section indicated on the Drawings or in the written Bid Documents.
- B. Provide the mix indicated on the Drawings or in the written Bid Documents.

1.02 References

- A. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition (WisDOT).

1.03 Submittals

- A. Preconstruction Submittals
 - 1. Submit mix design, meeting all necessary criteria for all mixtures to be used on the project. Conduct the mix design in accordance with WisDOT 460.
- B. Construction Submittals:
 - 1. Submit density testing records.
 - 2. Submit truck weight slips.

1.04 Quality Assurance

- A. Qualifications of Asphalt Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in the production of hot-mix, hot-laid asphalt concrete.
- B. Qualifications of Testing Agency: Use only recognized commercial-testing laboratory experienced in testing asphalt concrete materials.

1.05 Job Conditions

- A. Weather Limitations
 - 1. Asphalt concrete surface course material shall not be placed during the calendar period between November 1st and April 15th except with written approval of Engineer of a cold weather paving plan provided by the Contractor.
 - 2. Asphalt concrete material shall not be placed when air temperature is less than 36⁰F as measured 3 feet above the ground in the shade and away from the effects of artificial heat.
 - 3. Asphalt concrete materials shall not be placed on frozen or excessively wet base course or when it is raining.
- B. Traffic Control
 - 1. Maintain vehicular and pedestrian traffic during paving operations as required for other construction activities.
 - 2. Provide flagmen, barricades, warning signs and lights as needed to provide for safety and movement of traffic.

PART 2 - PRODUCTS

2.01 Asphaltic Mixture Design

- A. Conduct the asphaltic mixture design in accordance with WisDOT Table 460-2. Mixture requirements are as follows:

Mixture Type	LT	MT
ESALs x 10 ⁶ (20 yr design life)	< 2	2 to < 8
LA Wear (AASHTO T 96)		
100 revolutions (max % loss)	13	13
500 revolutions (max % loss)	50	45
Soundness (AASHTO T 104) (sodium sulfate, max % loss)	12	12
Freeze/Thaw (AASHTO T 103) (specified counties, max % loss)	18	18
Fractured Faces (ASTM D5821) (one face/2 face, % by count)	65 / ___	75 / 60
Thin or elongated (ASTM D4791) (max % by weight)	5 (5:1 ratio)	5 (5:1 ratio)
Fine Aggregate Angularity (AASHTO T 304, Method A, min)	40	43
Sand Equivalency (AASHTO T 176, min)	40	40
Gyratory Compaction		
Gyrations for N _{ini}	6	7
Gyrations for N _{des}	40	75
Gyrations for N _{max}	60	115
Air Voids, %V _a	4.0 ⁽⁶⁾	4.0 ⁽⁶⁾
% G _{mm} @ N _{des}	96.0	96.0
% G _{mm} @ N _{ini}	≤91.5 ⁽¹⁾	≤89.0 ⁽¹⁾
% G _{mm} @ N _{max}	≤98.0	≤98.0
Dust to Binder Ratio ⁽²⁾ (% passing 0.075/P _{be})	0.6 - 1.2	0.6 - 1.2
Voids filled with Binder (VFB or VFA, %)	60 - 80 (4, 5)	65 - 75 (3, 4)
Tensile Strength Ratio - TSR (ASTM D4867)		
no antistripping agent	0.75	0.75
with antistripping agent	0.80	0.80
Draindown at Production Temperature (%)	-----	-----

- (1) The percent maximum density at initial compaction is only a guideline.
(2) For a gradation that passes below the boundaries of the caution zone (ref. AASHTO MP3), the dust to binder ratio limits are 0.6 - 1.6.
(3) For 9.5 mm and 12.5 mm nominal maximum size mixtures, the specified VFB range is 70 - 76%.
(4) For 25.0 mm nominal maximum size mixtures, the specified VFB lower limit is 67%.
(5) For 37.5 mm nominal maximum size mixtures, the specified VFB lower limit is 67%.
(6) Shall conform to current WisDOT ASP 6, 460.2.1, which includes the regression of air voids from 4.0% to 3.0% with asphalt cement.

2.02 Aggregate

- A. Provide aggregate conforming to WisDOT Table 460-1. Aggregates shall consist of hard durable particles and shall not contain more than a combined total of one percent, by mass, of lumps of clay, loam, shale, soft particles, organic matter, adherent coatings, and other deleterious matter. The composite aggregates shall conform to the requirements of the Mixture Requirements Table and the Aggregate Gradation Table.

Aggregate Gradation Percent Passing By Weight				
Sieve Size	25.0 mm (#2)	19.0 mm (#3)	12.5 mm (#4)	9.5 mm (#5)
37.5 mm	100	---	---	---
25.0 mm	90 - 100	100	---	---
19.0 mm	90 max	90 - 100	100	---
12.5 mm	---	90 max	90 - 100	100
9.5 mm	---	---	90 max	90 - 100
4.75 mm	---	---	---	90 max
2.36 mm	19 - 45	23 - 49	28 - 58	20 - 65
75 um	1 - 7	2 - 8	2 - 10	2 - 10
% Min VMA	12.0	13.0	14.0	15.0

- B. Unless otherwise designated in the contract, the nominal size of aggregate used in the mixture shall conform to the following:

Pavement Thickness	Aggregate Size	
	Binder	Surface
3"	12.5 mm	9.5 mm
3 1/2"	12.5 mm	12.5 mm
4"	19.0 mm	12.5 mm
4 1/2"	19.0 mm	12.5 mm
5"	19.0 mm	12.5 mm

2.03 Asphalt Cement

- A. PG 58-28 S or H.
 B. Tack Coat: Emulsified asphalt - Grade SS-1; WisDOT 455.2.5

2.04 Recycled Asphaltic Materials

- A. Recycled Asphalt Shingles can be used as follows: 5-7% binder, 2% surface. WisDOT 460.2.5

2.05 Recovered Asphaltic Binders

- A. WisDOT 460.2.6

PART 3 - EXECUTION

3.01 Lines and Grade

- A. Lines and grade shall be as shown on the drawings or as given by the Engineer.
 B. When curb & gutter is in place, the Contractor shall use the curb & gutter for line and grade. For streets without curb and gutter, the Engineer will provide grade stakes at a minimum distance of 50 feet along the centerline. Provide the Engineer with a minimum 48 hours' notice of the need for grade stakes.
 C. Parking lots will be staked as required.

3.02 Surface Preparation

- A. Proof Roll
 1. Proof-roll prepared base surface using heavy rubber-tired roller or loaded tandem-axle dump truck under the observance of the Engineer. Aggregate surface shall not rut or displace significantly under the weight of the equipment. Soft or unstable areas that cannot be improved by additional compaction shall be undercut, replace with suitable fill material, and recompacted.
 2. Do not begin paving until necessary corrections are made.

- B. Loose and Foreign Material
 1. Remove loose and foreign materials from compacted base or old surface course immediately before paving.
 2. Use power brooms or blowers and hand brooming as required.
- C. Tack Coat (WisDOT 455.3.2.1)
 1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or Portland cement concrete and similar surfaces.
 2. Apply at a rate of 0.05-0.07 gallons per square yard of surface with a power distributor.
 3. Apply only when air temperature is 36° F or higher.
 4. Apply tack coat by brush to contact surfaces of curbs, gutters, manholes and other structures projecting into or abutting asphalt concrete pavement.
 5. Apply tack coat between all layers. This work shall be incidental to the asphalt paving.
- D. Existing Pavement Correction
 1. Fill potholes, sags and depressions.
 2. Material may be placed by hand.

3.03 Frame Adjustments

- A. Prior to paving, set frames of subsurface structures to final grade. Covers shall be one-half inch below surface of adjacent pavement with the tops of manholes the same slope as the surrounding pavement.

3.04 Preparing the Mixture

- A. Comply with applicable sections of WisDOT 450 for material storage, control, mixing and for plant equipment and operation.

3.05 Equipment

- A. Provide size and quantity of equipment to complete the work specified within the project time schedule.
- B. Paving shall be placed with a self-propelled spreading and finishing machine that spreads the hot-asphalt concrete mixture without tearing, shoving or gouging the surface and that controls pavement edges to true lines without use of stationary forms.
- C. Rolling equipment shall be self-propelled steel-wheel rollers of the three-wheel, tandem or three-axle tandem type. Three-wheel and tandem rollers shall be rated at not less than 8 tons. Three-axle tandem rollers shall be rated at not less than 12 tons.

3.06 Placing the Mix

- A. Do not place asphaltic mixture when the air temperature approximately three feet above grade, in shade, and away from artificial heat source is less than 36° F.
- B. Place asphalt concrete mixture on prepared surface, spread and strike off using paving machine.
- C. Spread mixture at a temperature between 250°F and 350°F.
- D. Inaccessible and small areas may be placed by hand.
- E. Place each course at thickness so that when compacted, it will conform to the indicated grade cross section, finish thickness and density specified.
- F. Compacted Thickness of Individual Layers:

Pavement Thickness	Layer Thickness	
	Binder	Surface
3"	1 1/2"	1 1/2"
3 1/2"	1 3/4"	1 3/4"
4"	2 1/4"	1 3/4"
4 1/2"	2 3/4"	1 3/4"
5"	3"	2"

- G. Paver Placing
 1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section and at high side of sections on one-way slope and in direction of traffic flow.
 2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
 3. Complete binder course for a section before placing surface course.
- H. Hand Placing
 1. Spread, tamp and finish mixture using hand tools in areas where machine spreading is not possible.
 2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.
- I. Joints
 1. Carefully make joints between old and new pavements or successive day's work to ensure a continuous bond between adjoining work.
 2. Clean contact surfaces free of sand, dirt or other objectionable material, and apply tack coat.
 3. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.

3.07 Compacting the Mix

- A. While the mixture is still hot, compact thoroughly and uniformly by rolling. Provide sufficient number of rollers to obtain the required density and accomplish the rolling.
- B. Begin rolling operations as soon after placing as the mixture will bear weight of roller without excessive displacement.
- C. Do not permit heavy equipment, including rollers, to stand on finished surface before it has thoroughly cooled or set.
- D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- F. Do not roll centers of sections first.
- G. Breakdown Rolling
 1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
 2. Check crown grade and smoothness after breakdown rolling.
 3. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
- H. Second Rolling
 1. Follow breakdown rolling as soon as possible while mixture is hot and in condition for compaction.
 2. Continue second rolling until mixture has been thoroughly compacted.
- I. Finish Rolling
 1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
 2. Continue rolling until roller marks are eliminated and course has attained specified density.

3.08 Pavement Density

- A. Pavements shall be built with the Maximum Density Method, WisDOT 460.3.3, unless otherwise specified.
- B. Ordinary Compaction: Compact leveling, wedging, patching layers, driveways, and other non-traffic areas to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. Comply with WIDOT 450.3.2.6.

- C. Maximum Density Method: All courses or layers thereof of plant mixed asphaltic mixtures for which the Maximum Density Method is used shall be compacted to a density not less than the percentage shown in the Table of Maximum Required Density, WisDOT Table 460-3, for the applicable mixture and course.

3.09 Pavement Density Determination

A. General

1. Density testing shall be performed by an independent testing firm, hired by the contractor or by a trained and qualified employee of the Contractor if approved by the Engineer. Densities may be determined on the basis of cored/sawed holes or nuclear methods.
2. Density determination will be made as soon as practical after placement and compaction and prior to placement of subsequent layers. Do not re-roll compacted mixtures represented by samples or tests having deficient densities. Do not operate below the specified maximum density on a continuing basis. Stop production until the source of the problem is determined and corrected.
3. A lot shall represent 1500 lineal feet of mixture, or the quantity placed in one day if less than 1500 lineal feet, for each density requirement. Densities of binder and surface course mixtures shall be determined on the basis of nuclear methods. Random testing locations will be established by the Engineer.

- B. Tests: Five random tests will be taken on each lot. The lot density shall be the average of all samples taken.

- C. Compact all layers to the percent of the target maximum density as shown in the following table.

Minimum Required Density ⁽¹⁾		
Location	Layer	% of Target Maximum Density
		Mixture Type
		LT and MT
Traffic Lanes ⁽²⁾	Lower	93.0 ⁽³⁾
	Upper	93.0
Shoulders and Appurtenances	Lower	91.0
	Upper	92.0

- (1) The table values are for average lot density. If any individual test result falls more than 3% below the minimum required target maximum density, the engineer may investigate the acceptability of that material.
- (2) Includes parking lanes as determined by engineer.
- (3) Minimum reduced by 2% when the first lift of lower layer constructed on crushed aggregate or recycled base courses.

- D. Density Deficiency: When the density of a lot of compacted binder or surface course is less than the specified minimum, payment will be adjusted in accordance with the following table:

Adjusted Payment Schedule	
Percent Lot Density Below Specified Minimum	Percent of Contract Price
From 0.5 to 1.0 inclusive	98
From 1.1 to 1.5 inclusive	95
From 1.6 to 2.0 inclusive	91
From 2.1 to 2.5 inclusive	85
From 2.6 to 3.0 inclusive	70
More than 3.0	*

- * The lot shall be removed and replaced with a mixture at the specified density and, when acceptably replaced, will be paid for at the contract price; or the engineer may permit the unacceptable material to remain in place with a 50 percent reduction in payment.

3.10 Surface and Thickness Requirements

A. Surface Requirements

1. Provide final surface of uniform texture conforming to required grade and cross-section.
 2. Test finished surface of each asphalt concrete course for smoothness using a 10-foot straightedge applied parallel to and at right angles to centerline of paved area.
 3. Check surface areas at intervals directed by Engineer.
 - a. Binder course: 1/4 inch in 10 feet.
 - b. Surface course: 1/4 inch in 10 feet.
- B. Thickness Requirements
1. If the Engineer believes that the thickness of the compacted base or surface course is not at the specified thickness, the Contractor may be required to obtain 4-inch diameter samples to verify the thickness. The samples shall be obtained by sawing or coring and all sample holes shall be repaired with fresh mix and compacted.
 2. If the thickness is not as specified it will be the Engineer's option to adjust the contract price, require an overlay, or require some other remedial action.

3.11 Patching

- A. Remove and replace defective areas.
1. Cut out and fill with fresh hot-asphalt concrete.
 2. Compact by rolling to specified density and surface smoothness.
 3. Remove deficient areas for full depth of course.
 4. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
 5. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.12 Cleaning and Protection

- A. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened and, in no case, sooner than 6 hours.
- B. Provide barricades and warning devices as required to protect pavement and the general public.

END OF SECTION

SECTION 32 13 13
CONCRETE SIDEWALK

PART 1 - GENERAL

1.01 Section Includes

- A. Subgrade preparation.
- B. Aggregate base course.
- C. Furnishing, placement and finishing of concrete sidewalk, driveway and steps.

1.02 References

- A. ASTM A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- B. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. ASTM A616 - Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
- D. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- E. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds having Special Properties for Curing and Sealing.
- F. ASTM D1557 - Test Method for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Using 10-lb. (4.5-kg) Rammer and 18-in. (457 mm) Drop.
- G. ASTM D 1751 - Performed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- H. ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- I. ASTM D2487 - Classification of Soils for Engineering Purposes.
- J. Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, 2003 (WisDOT).

1.03 Submittals

- A. Concrete delivery tickets.
- B. Manufacturer's data and installation instructions for curing/sealing compound.

1.04 Weather Limitations

- A. Cold Weather Placement
 1. Do not place concrete when air temperature is 40 degrees F and falling. Placement may commence when air temperature is 35 degrees F and rising.
 2. Insulate concrete to maintain a minimum temperature of 50 degrees F for not less than 72 hours and a temperature above freezing for the remainder of the curing period.
 3. The subgrade shall be free of frost.
 4. Water and aggregates may be heated prior to mixing so that the temperature of the in-place concrete is between 50 and 85 degrees F.
- B. Warm Weather: Temperature of in-place concrete shall not exceed 85 degrees F except where an approved retarder is used. In no case shall the in-place temperature exceed 95 degrees F.
- C. Do not place during rain, sleet or snow.

1.05 Equipment

- A. Equipment, machines and tools shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements.
- B. Slip forming machines shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating and shaping the plastic concrete to the desired cross section in one pass.

PART 2 - PRODUCTS

2.01 Materials

- A. Concrete: Class D, air entrained concrete. See Section 03 31 00 or 03 31 01 for concrete.
- B. Reinforcing Steel: ASTM A616 or A616, Grade 60, deformed bars; ASTM A185 welded wire fabric.
- C. Curing/Sealing Material:
 - 1. An acrylic resin curing, sealing, and hardening compound for exterior freshly placed concrete that provides a durable, long-lasting moisture impermeable finish that improves resistance to chemicals, grease, and de-icing salts.
 - 2. Meet requirements of ASTM C1315, Type 1, Class B and ASTM C309, Type 1, Classes A and B.
 - 3. Manufacturer: AS-1 Achro Seal 1315 OTC, TK Products; Seal Cure 309-30, W.R. Meadows; or equal.
- D. Preformed Expansion Joint Fillers: ASTM D1751 or ASTM D1752.
- E. Crushed Aggregate Base: Provide crushed aggregate base meeting gradation requirements of WisDOT 305 as reproduced below:

Sieve Size	Percentage Passing By Weight	
	1 1/4-Inch Base	3/4-Inch Base
1 1/4-Inch	95 - 100	- - -
1-Inch	- - -	100
3/4-Inch	70 - 93	95 - 100
3/8-Inch	42 - 80	50 - 90
No. 4	25 - 63	35 - 70
No. 10	16 - 48	15 - 55
No. 40	8 - 28	10 - 35
No. 200	2 - 12	5 - 15

- F. Common Fill: Natural soil free from organic matter, debris, vegetation, stones larger than six inches, and frozen material and classified as GW, GP, GM, GC, SW, SP, SC, ML or CL in ASTM D2487.

PART 3 - EXECUTION

3.01 Lines and Grade

- A. Construct walk to lines and grade shown on the Drawings or as given by the Engineer.
- B. Engineer will provide grade stakes at 50-foot intervals on straight sections, at 25-foot intervals on curves, and at tangent points.
- C. Inform Engineer at least 48 hours in advance of the need for grade stakes.
- D. Use short vertical curves where change in grade exceeds two percent.
- E. Normal cross slope is two percent towards the street.
- F. Do not exceed a four percent longitudinal slope for a distance of two feet from the top and bottom of steps.

3.02 Subgrade Preparation

- A. Excavate to required subgrade and compact to 95 percent of the maximum dry density in accordance with ASTM D1557.
- B. Use common fill for areas needing fill. Place in maximum 8-inch compacted layers. Compact to 95 percent of the maximum dry density in accordance with ASTM D1557. Unless otherwise indicated on the Drawings, the top of the fill shall extend one foot beyond the edge of the walk.

3.03 Base

- A. Place crushed aggregate base material on prepared subgrade to a minimum compacted thickness of three inches. Compact to 95 percent of the maximum dry density.

3.04 Forms

- A. Wood or metal forms, straight, and of sufficient strength to resist placement during pouring. Wood forms shall be surfaced plank, 2-inch nominal thickness. Steel forms shall be channel-formed sections with a flat top surface. Forms shall be at least equal to the thickness of the concrete.
- B. Clean and oil forms prior to use.

3.05 Placing and Finishing

- A. Place concrete on moistened base material in one layer. Consolidate sufficiently to bring moisture to the surface and strike off. Placing, consolidating and striking may be by hand or with a slip forming machine.
- B. Finish surface with a smooth wood float until the surface is true to grade and section and uniform in texture. Before mortar has set steel trowel the surface and brush troweled surface with a broom or brush transverse to the direction of traffic.
- C. Do not remove forms until the concrete has been in place for at least 12 hours.
- D. Edges of walk and edge of joints shall be rounded with a 1/4 inch radius edger.
- E. Surface and edges shall be true and free from tool marks.
- F. After forms are removed, paint honey-combed areas with mortar.

3.06 Contraction Joints

- A. Provide transverse contraction joints at five foot intervals. If walk is greater than 12 feet wide, provide a longitudinal joint at the midpoint.
- B. Form joints by cutting the concrete not less than 1/4 of the depth with a pointed trowel or other suitable tool. Finish edges with a 1/4-inch radius tool. Joints shall have a minimum width of 1/8 inch and a minimum depth of 1 inch.

3.07 Expansion Joints

- A. Form expansion joints with 1/2 inch thick preformed filler. Filler shall extend the full depth of the concrete with the top slightly lower than the concrete surface.
- B. Place expansion joints at uniform intervals not exceeding 100 feet, between walk and abutting curb, between walk and driveway approaches, and between walk and buildings or other rigid structures.

3.08 Reinforcement

- A. Install reinforcement when crossing sewer, water main, and lateral trenches and as indicated.

3.09 Steps

- A. Construct steps in accordance with the Drawings or as directed by the Engineer.

- B. Provide a rubbed finish on riser surfaces and sides of steps.

3.10 Handicap Ramps

- A. Provide handicap ramps at all intersections. Provide handicap ramps at other locations, as indicated on the Drawings or as directed by the Engineer.
- B. The ramp surface shall have a detectable warning surface:
 - 1. Provide diamond pattern surface texture made by impressing and removing a concrete form or an expanded metal industrial mesh while the concrete is still plastic. The pattern shall have diamonds 1 ¼ Inch x 2 ¼ inch. The diamonds shall be 1/4" to 3/8" apart and shall be 1/4" to 3/8" deep. The long dimension shall be parallel with the direction of travel.
 - 2. Provide plastic truncated dome tiles in accordance with Section 32 17 26 when indicated on the Drawings.

3.11 Curing and Protection

- A. Cure and seal concrete with a uniform coating of membrane curing/sealing compound.
- B. Apply with sprayer in accordance with the manufacturer's printed instructions.
- C. Apply two coats at right angles to each other.
- D. Do not apply if the temperature of the concrete is less than 40°F.
- E. Protect concrete from all traffic for three days and from vehicular traffic for seven days.

3.12 Defects

- A. If sidewalk cracks between contraction joints, settles, or spalls within one year of placement, the Engineer may require the defective concrete to be removed and replaced at no expense to Owner.
- B. Full blocks from joint to joint shall be removed.

END OF SECTION

SECTION 32 17 23.14

PAVEMENT MARKING

PART 1 - GENERAL

1.01 Section Includes

- A. Traffic control markings for pavement.

1.02 References

- A. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition (WisDOT).

PART 2 - PRODUCTS

2.01 Paint

- A. A fast-drying, waterborne paint formulated for traffic markings meeting the requirements of WisDOT 646.

2.02 Line Types

- A. Line types shall have the width and color as follows:
 1. Centerline: 4-inch, yellow, solid.
 2. No Passing: 4-inch, yellow, dashed.
 2. Lane Line: 4-inch, white, solid.
 3. Edge Line: 4-inch, white, solid.
 4. Stop Line: 12-inch, white, solid.
 5. Crosswalk: 6-inch, white, solid.
 6. Parking Stalls: 4-inch, white, solid.

PART 3 - EXECUTION

3.01 Preparation

- A. Pavement shall be dry and free from frost.
- B. Remove dust, dirt, glaze, oil, grease, loose paint, gravel, debris or other materials that may prevent proper bonding.
- C. Accurately layout the markings.

3.02 Application

- A. Do not apply below the minimum pavement temperature recommended by the manufacturer.
- B. Place markings as indicated on the Drawings or as directed by the Engineer.
- C. Applied lines shall have a uniform width.
- D. Applied lines and symbols shall have a uniform color. Edges of lines and symbols shall have a reasonably sharp cutoff.
- E. Apply paint at a rate of 17.6 gallons per mile of 4-inch wide line.

3.03 Protection

- A. Protect painted markings from traffic until paint is sufficiently dry to preclude pickup under traffic.

END OF SECTION

SECTION 32 92 19

SOIL PREPARATION AND SEEDING

PART 1 - GENERAL

1.01 Section Includes

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Fertilizer.
- D. Seeding.
- E. Mulching.

1.02 Quality Assurance

- A. Comply with requirements of state regulations regarding grass seed and fertilizer.
- B. Fertilizer
 - 1. Each container shall be plainly marked with the analysis of the contents showing the minimum percentages of total nitrogen, available phosphorous and soluble potash. Containers or packages shall be new and unopened.
 - 2. When furnished in bulk, each shipment shall be accompanied by an invoice indicating minimum percentages of the contents listed above.
- C. Seed
 - 1. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging and location of packaging. Containers or packages shall be new and unopened.
 - 2. Seed shall not be used later than one year later than the test date appearing on the label.
 - 3. Sampling and testing of seed for purity, germination and weed seed content shall be in accordance with "Rules for Testing Seed" published by the Association of Official Seed Analysts.

1.03 Submittals

- A. Submit composition of fertilizer and seed mixture.
- B. Submit, upon request, manufacturer's certification that materials meet specification requirements.
- C. Submit, upon request, results of seed purity and germination tests.
- D. Submit topsoil test results for all topsoil borrow.

PART 2 - PRODUCTS

2.01 Topsoil

- A. Provide reclaimed topsoil from the site unless the contract documents require topsoil borrow.
- B. Reclaimed Topsoil: Topsoil stripped from the site consisting of loam, sandy loam, silt loam, or silty-clay loam, or clay loam, humus-bearing soil, adapted to sustaining plant life. The soil shall be free of subsoil, foreign matter, plant material, objects larger than one inch in any dimension, and toxic or other substances harmful to plant growth.
- C. Topsoil Borrow: Topsoil from offsite consisting of natural loam, sandy loam, silt loam, or silty-clay loam, or clay loam, humus-bearing soil, adapted to sustaining plant life. The soil shall be free of subsoil, foreign matter, plant material, objects larger than one inch in any dimension, and toxic or other substances harmful to plant growth. The soil shall have a pH range of 5.5 to 8.0 and a maximum soluble salt level of 500 PPM. Topsoil originating from agricultural fields shall be free of

residual herbicide and other contaminants.

2.02 Fertilizer

- A. Standard commercial fertilizer with the following available nutrients by weight:
1. Nitrogen - not less than 10%.
 2. Phosphoric Acid - not less than 10%
 3. Potash - not less than 10%

2.03 Seed

- A. Seed mixtures shall be Olds Seeds or equal of grass species and varieties, proportions by weight, and minimum percentages of purity and germination as indicated in the following schedule.

Species	Purity Min. %	Germination Min. %	Quick-2-Gro	Survivor	Boulevard	Wear-n-Tear
Kentucky Bluegrass	98	85	25	15		50
Creeping Red Fescue	97	85	25	30	25	10
Turf Type Tall Fescue	98	85		40	25	
Fine Fescue	97	85				
Dawson Red Fescue	97	85				
Perennial Ryegrass	97	85	25	15	25	40
Annual Ryegrass	97	90	25			
Alkaligrass	98	85			25	

Unless otherwise provided in the Contract Documents, the selection of seed mixtures shall be as follows:

1. Quick-2-Gro: Use for general seeding within new subdivisions.
2. Survivor: Use for seeding lawns where soils are light and sandy.
3. Wear-n-Tear: Use for seeding lawns where soils are loam or clay.
4. Boulevard: Use for boulevard areas behind curb to sidewalk or ROW, from shoulder to ROW on rural section roads, and street or parking lot islands.

2.04 Mulch Materials

- A. Hay: Straw or hay in air-dry condition substantially free from noxious weed seeds or objectionable foreign matter.
- B. Paper Fiber: Mulch consisting of recycled newsprint fibers, wetting agent, deforming agent and green dye with a dry moisture content of 9 to 15 percent.
- C. Wood Cellulose: Wood cellulose fibers manufactured from virgin wood fibers that form a blotter-like ground cover that readily absorbs water and allows infiltration to the underlying soil. Moisture content shall not exceed 15 percent at the time of delivery. The mulch shall be dyed green and shall have the property of becoming dispersed and suspended when agitated in water.
- D. Erosion Control Revegetative Mat: A light duty, organic, non-netted mat with a minimum thickness of 3/8 inch and biodegradable yarn or glue on 12 inch maximum centers in the longitudinal direction. The mat shall be capable of withstanding moderate foot traffic without tearing or puncturing. Acceptable products are those listed in the Wisconsin Department of Transportation, Erosion Control Product Acceptability Lists for Class I, Type Urban mats. Anchoring devices shall be biodegradable, non-splintering and shall last for at least two months and shall substantially degrade in four months.

2.05 Tackifiers

- A. Latex-Base: A latex emulsion polymer with a composition by weight of 48 percent styrene, 50 percent butadiene and 2 percent additive; 42 to 46 percent solids; and a pH of 8.5 to 10.
- B. Guar Gum: Guar gum tackifiers consisting of a minimum of 95 percent Guar gum by weight with the remaining consisting of dispersing and cross-linking additives.

- C. Other: Water soluble natural vegetable gums or guar gums blended with gelling and hardening agents or a water soluble blend of hydrophilic polymers, viscosifiers, sticking aids and other gums.

PART 3 - EXECUTION

3.01 Inspection

- A. Examine area to receive soil preparation to ensure subsoil is ready for finish grading.
- B. Do not proceed with soil preparation until unsatisfactory conditions are corrected.

3.02 Preparation of Subsoil

- A. Eliminate uneven areas or low spots. Make changes in gradual and blend slopes into level areas.
- B. Do not prepare or place frozen soils or soils with excessive moisture.
- C. Remove weeds, roots, trash, debris, concrete, asphalt, crushed aggregate, and any stones larger than two inches in any dimension.
- D. Scarify subsoil to a depth of three inches.

3.03 Placing of Topsoil

- A. Spread topsoil evenly to a compacted depth of four inches.
- B. Place during dry weather.
- C. Grade to eliminate rough or low areas and to ensure positive drainage. Grading shall be approved by the Engineer.
- D. Remove stones and other objects larger than one inch in any dimension.

3.04 Fertilizing

- A. Apply fertilizer at a rate of seven pounds per 1000 square feet.
- B. Apply fertilizer uniformly, incorporating it into the soil by light disking or harrowing.
- C. Apply fertilizer prior to seeding.

3.05 Seeding

- A. Do not sow seed on frozen soil or when wind exceeds 5 MPH.
- B. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
- C. Seeding Dates:
 1. Spring/Summer: April 1 to August 14.
 2. Fall: August 15 to October 1.

- D. Application Rate:

Application Rate	
Mixture	Lbs/1000 Sq. Ft.
Quick-2-Gro	5 - 6
Survivor	5 - 6
Wear-n-Tear	4 - 5
Boulevard	5 - 6

- E. Broadcasting
 1. Sow seed evenly with a spreader or seeding machine.
 2. Do not broadcast or drop seed when wind velocity exceeds 5 MPH.
 3. Broadcast one half of seed.
 4. Broadcast remaining half of seed at right angles to first seed pattern.

5. Cover seed to a depth of 1/4" by raking, dragging or cultipacting.
 6. Roll seeded area with roller weighing a maximum of 150 pounds per foot of roller width.
 7. Water seeded area with fine spray, if required, to promote growth.
- F. Drilling
1. Drill seed following elevation contours.
 2. Seed to uniform depth.
 3. Roll seeded area with roller weighing a maximum of 150 pounds per foot of roller width.
 4. Water seeded area with fine spray, if required, to promote growth.

3.06 Mulching

- A. Place mulch on same day that the area is seeded.
- B. Do not place straw or hay mulch or sprayed-on mulches during periods of high wind.
- C. Mulch type and method is the Contractor's option unless a specific type or method is indicated on the Drawings or in the Contract Documents.
- D. Hay/Straw Mulch
1. Method 1 - Spread straw or hay treated with a tackifier over the area using a blowing machine. Spread the material uniformly to a depth of 1/2 to 1 inch using 1 1/2 to 3 tons of material per acre. The amount of tackifier used shall be in accordance with the manufacturer's recommendations.
 2. Method 2 - Spread hay or straw over the area by hand or using a blowing machine. Spread the material uniformly to a depth of 1/2 to 1 1/2 inch using 1 1/2 to 3 tons of material per acre. Immediately after spreading, anchor the mulch into the soil using a mulch tiller.
- E. Paper Fiber: Apply with hydraulic spray equipment in a water slurry at the rate necessary to provide a 1/4 inch layer. Use the color of the material as a metering agent. Take care not to spray material on adjacent surfaces.
- F. Wood Cellulose: Apply with hydraulic spray equipment in a water slurry at the rate of 1500 pounds per acre. Use the color of the material as a metering agent. Take care not to spray material on adjacent surfaces.
- G. Mat: Remove all clods, stones or other materials that could damage the mat. Place mat over seeded area without overlapping. Anchor mat in accordance with the manufacturer's recommendations.

3.07 Establishment

- A. Establishment Period:
1. For areas seeded during the spring or summer planting season the establishment period shall be 90 days.
 2. For areas seeded during the fall planting season the establishment period shall be through June 1 of the following year.
- B. Acceptable Establishment: At the end of the establishment period the grass shall be healthy, uniform in density and color, and substantially free of weeds with uniform coverage of at least 70 percent of a representative one square yard plot and bare spots not exceeding 6 inches by 6 inches.
- C. Re-seed areas that fail to grow an acceptable stand of grass.

3.08 Protection

- A. Protect all seeded areas, as necessary, to prevent trampling and/or damage by erecting temporary fences, barriers, signs, etc.

END OF SECTION

SECTION 33 11 13
WATER MAIN CONSTRUCTION

PART 1 - GENERAL

1.01 Section Includes

- A. Furnishing and installation of water main, valves, and hydrants.
- B. Furnishing and installation of service laterals.

1.02 Related Sections

- A. Section 33 05 26 - Tracer Wire.
- B. Section 31 23 33 - Utility Excavation, Backfilling and Compaction.

1.03 References

- A. ASTM B88 - Seamless Copper Water Tube.
- B. ASTM D2487 - Classification of Soils for Engineering Purposes.
- C. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- D. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch (75 mm through 1200 mm) for Water and Other Liquids.
- E. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- F. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.
- G. AWWA C153 - Ductile-Iron Compact Fillings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. Through 64 In. (1400 mm through 1600 mm) for Water Service.
- H. AWWA C502 - Dry-Barrel Fire Hydrants.
- I. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
- J. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- K. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure pipe and Fittings for Water.
- L. AWWA C651 - Disinfecting Water Mains.
- M. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch, for Water Distribution.

1.04 Submittals

- A. Product data on pipe, fittings, valves, and hydrants.
- B. As built measurements.

1.05 Quality Assurance

- A. Provide at least one person thoroughly trained and experienced in the skills required, who is completely familiar with the work described in this section, and who shall be present at all times during progress of the work of this section and who shall direct all work performed under this section.
- B. All materials shall be new and free from defects. Each length of pipe shall be clearly marked with

the manufacturer's name, type of pipe, and the class of pipe.

- C. Hydrostatic pressure testing and electrical conductivity testing required.
- D. Disinfection and bacteriological sampling required.

PART 2 - PRODUCTS

2.01 Pipe Materials

- A. Ductile Iron Pipe:
 - 1. Pipe: AWWA C151, Class 52; cement-mortar lining, AWWA C104.
 - 2. Joints: Mechanical joint or push-on, AWWA C111.
 - 3. Electrical Conductivity: Factory applied terminals with copper straps or cables capable of carrying 600 amps.
- B. PVC Pipe (Use only when indicated on Drawings)
 - 1. Pipe: AWWA C900, Class 150 (DR-18) with cast iron O.D.
 - 2. Joints: Rubber gasket.

2.02 Fittings

- A. Ductile Iron, AWWA C110 or AWWA C153.
- B. Mechanical Joint Restraint:
 - 1. Ductile iron mechanical joint restraining gland.
 - 2. Ductile Iron Pipe: MEGALUG 1100 or equal.
 - 3. PVC Pipe: MEGALUG 2000PV or equal.

2.03 Gate Valves

- A. Acceptable Manufacturers: Kennedy, Model KS-RW; American Flow Control, Series 2500; or equal.
- B. Gate Valves:
 - 1. Resilient seated, ductile iron.
 - 2. AWWA C515, 250 psi working pressure.
- C. Valve Construction
 - 1. Meet appropriate AWWA specification.
 - 2. All internal ferrous surfaces shall be epoxy coated. The exterior of buried valves shall be coated with epoxy.
 - 3. Valves to be field painted shall have all cast iron surfaces coated with primer.
 - 4. Joints: Flange joints, ANSI 16.1, Class 125; mechanical joints, AWWA C111.
 - 5. Valves shall be non-rising stem with square stem operating nut for socket wrench operation.
 - 6. All valves shall be opened by turning left.
- D. Valve Box
 - 1. Valve Box: Cast iron 3-piece box with screw type adjustment. The word "WATER" shall be cast into box cover.
 - 2. Valve Box Centering Device:
 - a. A valve box centering device that sets on the valve and is constructed of polyurethane coated steel with a rubber gasket between the device and the valve; Adapter, Inc. or equal.
 - b. A factory attached valve box centering device consisting of stainless steel clips, American Flow Control Tenor Valve Box Centering Device or equal.
- E. Alternate Valve Box (Use if indicated in Contract Documents)
 - 1. Complete assembly composed of the valve box and extension stem. The valve box top shall be cast iron and the upper and lower pipes may be cast iron or high density polyethylene. The box assembly shall be adjustable.
 - 2. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The design shall include a means to prevent the stem assembly from disengaging when fully extended. The extension stem shall survive a torque test of 1,000 ft-lb without failure.
 - 3. Manufacturer: American Flow Control Trench Adapter or equal.

2.04 Fire Hydrants

- A. Hydrant: Dry-barrel type, AWWA C502; Waterous Pacer Model WB-67 with a 16" upper barrel section, unless a specific manufacturer is indicated elsewhere in the Contract Documents.
- B. Design
 - 1. Traffic model type equipped with a barrel ground-line flanged coupling and main rod coupling designed to fail completely and uniformly when the hydrant is impacted by a motor vehicle. Weakened steel or weakened cast iron bolts used in breakable barrel couplings are not acceptable.
 - 2. Designed for working pressure of 150 psi.
 - 3. Main valve shall open against system pressure and shall be not less than 5 1/4-inch.
 - 4. No excavation shall be required to remove main valve and movable parts of main valve.
 - 5. Drain port.
 - 6. Bury length of 7.5 feet from bottom of connecting pipe to ground line.
 - 7. Mechanical joint inlet connection.
 - 8. Open by turning counterclockwise.
 - 9. Outlets: Two 2-1/2-inch hose nozzles, one 4-1/2-inch pumper nozzle with National Standard threads and caps with chains.
 - 10. Pentagonal operating nuts.
- C. Paint: Red, unless indicated otherwise. Paint in accordance with AWWA C502, Section 4.2.

2.05 Tapping Sleeve

- A. Tapping Sleeve: Carbon steel, epoxy coated, mechanical joint.
- B. Manufacturer: Smith-Blair 622, Dresser 610, or equal.

2.06 Service Lateral

- A. Pipe: Copper, ASTM B88, Type K.

2.07 Corporation Stops

- A. Brass corporation stop with taper thread inlet and conductive compression outlet.
 - 1. 3/4" and 1": Mueller Ground Key Corporation Valve, H-15008 or equal.
 - 2. 1 1/2" and 2": Mueller Ori-Corp H-15013 or equal.

2.08 Curb Stops

- A. Brass curb stop with conductive compression inlet and outlet, quarter turn check, and Minneapolis top.
 - 1. 3/4" and 1": Mueller Mark II Oriseal H-15155 or equal.
 - 2. 1 1/2" and 2": Mueller 300 Ball Curb Valve B-25155 or equal.

2.09 Curb Box

- A. Cast iron extension type, Minneapolis pattern with stationary rod, 1 1/4" upper section, 7-foot length, pentagon nut.
- B. Mueller H-10300 or equal.

2.09 Service Saddles

- A. Ductile Iron Pipe: Double strap, epoxy-coated ductile iron with stainless steel straps; Smith-Blair 317 or equal.
- B. PVC Pipe: Stainless steel, single or double bolt; Smith-Blair 371, 372 or equal.

2.10 Bedding and Cover Material

- A. Provide bedding and cover material meeting the requirements of ASTM D2321, Class IA, IB, II or III described as follows:

1. Class IA - Clean angular crushed stone, crushed rock, or crushed gravel conforming to the following gradation:

Sieve Size	% Passing By Weight
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5

2. Class IB - Clean angular crushed stone, crushed rock, or crushed gravel conforming to the following gradation:

Sieve Size	% Passing By Weight
1/2"	100
3/8"	85 - 100
No. 4	10 - 30
No. 200	0 - 5

3. Class II - Clean coarse-grained soils free from organic matter, trash, debris, stones larger than 1-inch, and frozen material and classified in ASTM D2487 as follows:

GW - Well-graded gravels, gravel-sand mixtures, little or no fines.
 GP - Poorly-graded gravels, gravel-sand mixtures, little or no fines.
 SW - Well-graded sands, gravelly sands, little or no fines.
 SP - Poorly-graded sands, gravelly sands, little or no fines.

Excavated trench material may be used if it meets the above material requirements.

4. Class III - Coarse-grained soils with fines free from organic matter, trash, debris, stones larger than 1-inch, and frozen material and classified in ASTM D2487 as follows:

GM - Silty gravels, gravel-sand-silt mixtures.
 GC - Clayey gravels, gravel-sand-clay mixtures.
 SM - Silty sands, sand-silt mixture.
 SC - Clayey sands, sand-clay mixtures.

Excavated trench material may be used if it meets the above material requirements.

PART 3 - EXECUTION

3.01 Handling of Materials

- A. Handle all material with care to avoid damage. No material shall be dropped.
- B. Remove all defective material from the job site.
- C. Store materials in a manner that protects them from damage. Store hydrants and valves in a manner that provides protection from damage by freezing.

3.02 Lines and Grade

- A. Lay pipe to the lines and grades shown on the Drawings or given by the Owner's Representative.
- B. Locate all fittings, valves, and hydrants as shown on the Drawings or as given by the Owner's Representative.

3.03 Laying Pipe

- A. Unless otherwise indicated on the plans, all water mains, including hydrant leads, shall have a minimum depth of cover of 7.0 feet.
- B. Handle pipe, fittings, valves and hydrants in a manner to prevent damage. Use suitable equipment when lowering materials into the trench.
- C. Before pipe is laid, remove all foreign matter from the inside and remove all excess coating material, blisters, oil, grease, dirt and moisture from the inside of the bell end and the outside of the spigot end.
- D. The interior of the pipe shall be kept clean during laying, and no trench water shall be allowed to enter the pipe.
- E. Assemble joints in accordance with AWWA C600 for ductile iron pipe and AWWA C605 for PVC pipe.
- F. Pipe lines intended to be straight shall be so laid. Deflections from straight line or grade, when required, shall not exceed those listed below:

Maximum Deflection Full Pipe, Push-On Joints - D.I. Pipe

Pipe Diameter	Deflection Angle	Maximum Deflection - Inches	
		18-Ft. Length	20- Ft. Length
4"	5°	19	21
6"	5°	19	21
8"	5°	19	21
10"	5°	19	21
12"	5°	19	21

Maximum Deflection Full Pipe, Mechanical Joints D.I. & PVC

Pipe Diameter	Deflection Angle	Maximum Deflection - Inches	
		18-Ft. Length	20- Ft. Length
4"	8°-18'	31	35
6"	7°-7'	27	30
8"	5°-21'	20	22
10"	5°-21'	20	22
12"	5°-21'	20	22

PVC pipe with push-on joints shall not be deflected at joints. Pipe may be curved in accordance with the following table:

Longitudinal Bending Push-On Joints - PVC Pipe	
Pipe Size Inches	Minimum Bending Radius Feet
4	100
6	145
8	190
10	275
12	275

3.04 PVC Pipe Tracer Wire

- A. Furnish and install tracer wire for PVC water main in accordance with Section 33 05 26.

3.05 Pipe Bedding and Cover

- A. Place 4" of bedding material beneath pipe.
- B. Place bedding material around the pipe to the spring line. Work the material in and around the pipe by hand to provide uniform support.

- C. Place cover material carefully to a level six inches above the pipe.

3.06 Separation from Sewer

- A. Lay water mains a minimum of 8 feet from sewer lines (center to center).
- B. When water mains cross over sewers, provide a minimum of 12 inches from the bottom of the water main to the top of the sewer.
- C. When water mains cross under sewers, provide a minimum of 18 inches from the top of the water main to the bottom of the sewer.

3.07 Valve Installation

- A. Provide valve box for each valve unless the plans call for a valve manhole.
- B. Install valve adapter on valve and set box on adapter, as per manufacturer's instructions.
- C. Set valve box vertical with the cover flush with finish grade. Install box so that there is a minimum of six inches of adjustment above and below finish grade elevation.

3.08 Hydrant Installation

- A. Set all hydrants plumb and have the nozzles parallel with or at right angles to the curb line or street with the pumper nozzle facing the curb or street.
- B. Set hydrant height above grade as shown on the Standard Detail Drawings.
- C. Connect hydrants to the main with a 6-inch lead. Install a gate valve on the lead unless specifically deleted.
- D. Provide drainage at the base of the hydrant by placing crushed stone wrapped in geotextile at the base of the hydrant. The stone shall extend at least 6 inches above the hydrant drain port. Where ground waters rise above the drain port or when the hydrant is located within 8 feet of a sanitary or storm sewer, plug the drain port.
- E. Provide plastic bag or poly-wrap covering over top of hydrant until the water main has been accepted by Engineer for fire protection.

3.09 Thrust Restraint

- A. Provide joint restraints for mechanical joint connections on hydrant leads, hydrants, branch of tees, 45° bends, caps, and plugs. Install joint restraints in accordance with the manufacturer's instructions.
- B. In addition to joint restraints, provide precast concrete reaction block (cast-in-place concrete may be used) with an approximate weight of approximately 600 lbs. for all horizontal tees and bends, and for end caps, and hydrants. Concrete masonry blocks are not acceptable.
- C. For vertical offsets, provide joint restraints for all fittings and rods between fittings.

3.10 Hydrostatic Testing

- A. All water main and water services shall be tested hydrostatically to a pressure of 150 psi in accordance with AWWA C600. Perform testing in the presence of the Engineer or authorized representative of the Owner.
- B. Water services that serve fire protection systems only shall be tested as in A above except that the test pressure shall be 200 psi.
- C. The Contractor shall provide all equipment and shall perform all work required in connection with the tests.
- D. Each section tested shall be slowly filled with water, care being taken to expel all air from the pipes.

- E. Conduct leakage test at the same time or following the pressure test in accordance with AWWA C600 for ductile iron pipe and AWWA C605 for PVC pipe. The leakage test shall be for a minimum of two hours. The test pressure shall be maintained within 5 psi of the specified test pressure. The allowable leakage shall be determined by the following equation:

1. AWWA C600 - Ductile Iron Pipe

$$L = \frac{SD(P)^{1/2}}{133,200}$$

L = allowable leakage in gallons per hour.

S = length of pipe tested in feet.

D = nominal pipe diameters in inches.

P = average test pressure in psi.

Allowable Leakage - GPH/1,000 Ft. 150 PSI Average Test Pressure		Allowable Leakage - GPH/1,000 Ft. 200 PSI Average Test Pressure	
Pipe Size Inches	Allowable Leakage Gallons per Hour	Pipe Size Inches	Allowable Leakage Gallons per Hour
3	0.28	3	0.32
4	0.37	4	0.42
6	0.55	6	0.64
8	0.74	8	0.85
10	0.92	10	1.06
12	1.10	12	1.27

2. AWWA C605 - PVC Pipe

$$L = \frac{ND(P)^{1/2}}{7,400}$$

L = allowable leakage in gallons per hour.

N = number of joints in the length of pipe tested.

D = nominal pipe diameters in inches.

P = average test pressure in psi.

Pipe Size Inches	Allowable Leakage for 50 Joints (GPH) Average Test Pressure (PSI)	
	150	200
3	0.25	0.29
4	0.33	0.38
6	0.50	0.57
8	0.66	0.76
10	0.83	0.96
12	0.99	1.15

- F. Any section of pipe that fails the test shall be repaired and retested. The cost of the testing shall be included in the cost of the water main. No separate payment will be made.

3.11 Tapping Sleeve Testing

- A. All tapping sleeves shall be hydrostatically tested at a minimum of 150 PSI prior to tapping.

3.12 Electrical Conductivity

- A. Provide electrical conductivity (not applicable to PVC pipe). Bolt copper straps of push-on pipe together. For mechanical joint pipe, bolt copper strip to bell. Bare metal on bell prior to connection.
- B. For pipes cut in the field, exothermically weld the bonding straps to the pipe. The pipe metal shall be bared at the point of attachment. Coat bare metal with asphaltic material.
- C. Provide conductivity across all gate valves and across the hydrant bottom using a copper strap or #4 AWG bare copper wire welded to pipe on either side of the valve or hydrant bottom.

3.13 Disinfection and Bacteriological Testing

- A. Before being placed in service, the entire line shall be flushed and chlorinated in accordance with the requirements of AWWA C651.
- B. During the chlorination process, operate all valves, hydrants and accessories to ensure contact of all parts with the chlorine solution.
- C. After chlorination, the water shall be flushed from the system at its extremities until the chlorine concentration in the water leaving the mains is no higher than that generally prevailing in the system or less than 1 mg/l.
- D. After final flushing and before the water mains are placed in service, bacteriologically safe tests must be obtained. Two samples, at least 24 hours apart, are required. Sample in accordance with the requirements of AWWA C651.
- E. No separate payment will be made for the disinfection and bacteriological testing. The cost shall be included in the pipe installation items.

3.14 Service Connections

- A. Corporation stops for water service connections shall be placed to service each building site as required. The minimum water service size is 1-inch.
- B. Unless otherwise noted, construct copper service laterals to the property line. Set the curb stop and box at the property line. The lateral shall have a minimum 7.0 feet of cover.
- C. Installation
 1. Install copper service with 7.0 feet of cover.
 2. Locate service taps at the 10:00 or 2:00 o'clock positions on the circumference.
 3. Service taps shall be at least 12 inches apart. Stagger taps around circumference when more than one tap is made at same location.
 4. Prior to installation of corporation stop, wrap threads with two wraps of 3 mil Teflon tape.
 5. Provide a horizontal half loop in the service pipe at the tap.
- D. Water service laterals 2 1/2-inch diameter and larger shall have a minimum center-to-center horizontal separation of 8 feet from sewer laterals or mains.
- E. Water service laterals 2-inch diameter and smaller shall have a minimum center-to-center horizontal separation of 30 inches from sewer laterals or mains. Separation may be less than 30 inches if the bottom of the water lateral is at least 12 inches (outside pipe to outside pipe) above the sewer lateral or main.
- F. Service Saddles: All taps for PVC water main require a service saddle. Two inch taps on 6-inch ductile iron water main require a service saddle.

3.15 As-Built Measurements

- A. Provide as-built measurements clearly marked on a clean copy of the Construction Drawings. These as-built measurements are incidental to the Work. As a minimum, include the following items:
 1. Distance between valves, tees and bends.
 2. Ties from ground features to tees and bends to clearly located the buried utility construction.
 3. Distance from tees, valves, or bends to corporation stops.
 4. Length of service laterals.

END OF SECTION

SECTION 33 41 13
STORM SEWER CONSTRUCTION

PART 1 - GENERAL

1.01 Section Includes

- A. Construction of storm sewer.
- B. Construction of storm manholes and inlets.

1.02 Related Sections

- A. Section 31 23 33 - Utility Excavation, Backfill and Compaction.
- B. Section 33 39 13 - Sewer Manholes.

1.03 References

- A. ASTM A48 - Standard Specification for Gray Iron Castings.
- B. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- C. ASTM A760 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
- D. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
- E. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- F. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- G. ASTM C443 - - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- H. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
- I. ASTM C506 - Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
- J. ASTM C507 - Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
- K. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- L. ASTM A929 - Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.
- M. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- N. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- O. ASTM F2736 - Standard Specification for 6 to 30 in. (152 to762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe.
- P. ACI 304 - Recommended Practice for Measuring, Transporting, and Placing Concrete.
- Q. ACI 347 - Recommended Practice for Concrete Formwork.

1.04 Submittals

- A. Submit product data for pipe and accessories.

- B. Submit bedding gradation if requested.
- C. Submit as-built measurements.

PART 2 - PRODUCTS

2.01 Pipe

- A. Reinforced Concrete
 - 1. Pipe: ASTM C76, ASTM C506, or ASTM C507. Provide Class III unless otherwise indicated on the Drawings or in the Specifications.
 - 2. Joints
 - a. Circular Pipe: Tongue and groove with rubber gaskets, ASTM C443.
 - b. Elliptical and Arch Pipe: Tongue and groove with cold plastic sewer joint compound or tongue and groove with external sealing collar, MacWrap or equal.
- B. Corrugated Steel (Use only when indicated on Drawings)
 - 1. Galvanized Pipe:
 - a. Material: Galvanized steel coil, ASTM A929.
 - b. Pipe: Manufactured in accordance with ASTM A760, Type I or II.
 - 2. Aluminized Pipe:
 - a. Material: Aluminized Type 2 steel coil, ASTM A929.
 - b. Pipe: Manufactured in accordance with ASTM A760, Type I or II.
 - 3. Joints: Matching bond connectors.
 - 4. Minimum Pipe Gauge:

Minimum Pipe Gauge			
Pipe Diameter	2-2/3" x 1/2" Corrugations	Pipe Diameter	3" x 1" Corrugations
6"	18	60" - 90"	16
8" - 24"	16	96" - 102"	14
30" - 36"	14	108" - 114"	12
42" - 54"	12	120"	10
60" - 72"	10		
78" - 98"	8		

- C. Corrugated Polyethylene (Use only when indicated on Drawings.)
 - 1. Smooth interior, with annular exterior corrugations meeting requirements of ASTM F2736.
 - 2. Joints: Gasketed integral bell and spigot meeting requirements of ASTM F2736. Joints shall be watertight in accordance with ASTM D3212. Gaskets shall meet the requirements of ASTM F477.
 - 3. Fittings: Polyethylene fittings meeting requirements of ASTM F2736.
 - 4. Acceptable Manufacturers: ADS N-12 HP or equal.

2.02 End Sections

- A. Manufacturer's standard product.
- B. Provide concrete for concrete pipe and corrugated metal for steel pipe or polyethylene pipe.

2.03 Pipe Bedding and Cover

- A. Bedding and Cover:
 - 1. Class IA - Clean angular crushed stone, crushed rock, or crushed gravel conforming to the following gradation:

Sieve Size	% Passing By Weight
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5

2. Class IB - Clean angular crushed stone, crushed rock, or crushed gravel conforming to the following gradation:

Sieve Size	% Passing By Weight
1/2"	100
3/8"	85 - 100
No. 4	10 - 30
No. 200	0 - 5

3. Class II - Coarse-grained soils free from organic matter, trash, debris, and frozen material with 100% passing the 1-1/2" sieve and less than 5% passing the No. 200 sieve. Generally including sands, gravels, and sand-gravel mixtures with little or no fines. ASTM D2487 Soil Types GW, GP, SW and SP are included in this class. Excavated material may be used if it meets the above material requirements.
4. Class III - Coarse-grained soils with fines free from organic matter, trash, debris, and frozen material with 100% passing the 1-1/2" sieve and 12% - 50% passing the No. 200 sieve. Generally includes silty or clayey sands, gravels, or sand-gravel mixtures. ASTM D2487 Soils Types GM, GC, SM and SC, are included in this class. Excavated material may be used if it meets the above material requirements.

2.04 Manholes and Inlets

A. General

1. Precast concrete manholes and inlets shall meet requirements of Section 33 39 13. with the exceptions noted.
2. Interior manhole seals are not required.
3. Pipe connection may be mortar.
4. Concealed pick hole covers are not required.

B. Cast-In-Place Concrete

1. Ready-mixed concrete meeting requirements of ASTM C94; 3000 psi 28-day strength, 3 to 4-inch slump, maximum aggregate size of 1-1/2 inch and air entrainment of 7 percent.
2. Reinforcing steel: ASTM A615, Grade 60.

- ### C. Crushed Stone: Hard durable particles of crushed stone or gravel substantially free from shale or lumps of clay or loam meeting the following gradation:

Sieve Size	% Passing By Weight
2"	100
1-1/2"	90 - 100
1"	20 - 55
3/4"	0 - 15
1/2"	0 - 5

PART 3 - EXECUTION

3.01 Handling of Material

- A. All materials shall be handled with care to avoid damage. No material shall be dropped.
- B. All defective material shall be removed from the job site.
- C. Contractor is responsible for arranging suitable sites for material storage.

3.02 Lines and Grade

- A. All pipe shall be laid to the lines and grades shown on the drawings or given by the Engineer.
- B. The use of a laser beam for maintaining line and grade is required unless other methods are approved by the Engineer.
- C. A person qualified to operate the equipment shall be present when the laser is in use.

3.03 Laying Pipe

- A. Lay pipe uniformly to line and grade so that the finished sewer presents a uniform bore. Noticeable variations from true alignment and grade will be sufficient cause for rejection of the work.
- B. Commence at the lowest point and proceed to the upper end. Lay pipe with bell-end pointing up-grade.
- C. For reinforced concrete pipe provide a minimum of six inches between the pipe wall and the trench wall. For polyethylene and corrugated steel pipe, provide a minimum distance between the pipe wall and the trench wall of 2.5 times the pipe diameter for poor or expansive soils and a minimum of 12 inches for all other soils.
- D. Rest each pipe on the full length of its barrel.
- E. Do not lay the next pipe until the previous pipe is backfilled sufficiently to prevent movement during joining.
- F. For flexible pipe do not disturb the installed pipe and its embedment when using movable trench boxes. If the box extends below the cover material, use methods to assure that the integrity of the embedment is maintained when the box is moved.
- G. Keep water out of the pipe. Do not let water rise into or around the pipe until the trench is filled at least one foot above the pipe.
- H. When work is stopped for any reason, securely plug the end of the pipe.
- I. Jointing: Assemble joints in accordance with the pipe manufacturer's instructions.
- J. Do not drive over flexible pipe unless there is a minimum of 24 inches of cover material over the pipe.

3.04 Rigid Pipe Bedding - RCP

- A. Pipe bedding and cover shall be Class IA, Class IB, Class II, or Class III. If pipe is in groundwater, bedding and cover shall be Class IA or IB. Use the same material for bedding and cover.
- B. Place bedding material below and around pipe to the spring line to provide side support and to prevent lateral and vertical movement of the pipe. Place material in 6-inch maximum layers. Work the material in and around the pipe by hand to provide uniform support.
- C. Place cover material to a level 6 inches above the top of the pipe.

3.05 Pipe Bedding - Polyethylene and Corrugated Steel

- A. Pipe bedding and cover shall be Class IA or Class IB. If pipe is in groundwater, use Class IB.
- B. Place bedding material below and around pipe to the spring line to provide side support and to prevent lateral and vertical movement of the pipe. Place Class IA and Class IB material in 6-inch maximum layers. Work the material in and around the pipe by hand to provide uniform support.
- C. Place cover material to a level 12 inches above the top of the pipe. Place Class IA and Class IB material in maximum 6-inch layers. Class IA material shall be worked by hand. Class IB material shall be compacted using hand tampers or vibratory compactors. Each stage shall be compacted by hand or mechanical tamping to the percent of the maximum dry density in accordance with ASTM D698 indicated below:

Material	Density
Class IA	None
Class IB	85%

- D. Do not use a hydrohammer with less than 4 feet of cover over the pipe.

3.06 Manhole and Inlet Construction

- A. Cast-In-Place: Cast-in-place manholes and inlets shall be constructed as shown on the Drawings. If cast-in-place manholes are not shown and the Contractor desires to provide them in lieu of precast concrete, Shop Drawings prepared by a qualified Engineer must be submitted for approval.
- B. Construction
 - 1. Provide two to four inches of precast adjusting rings unless otherwise indicated.
 - 2. Manholes that are constructed when temperature is below 35°F shall be protected from freezing.
 - 3. Limit the manhole excavation to the size required to install the manhole. Provide bracing and sheathing as necessary.
 - 4. Provide six inches of crushed stone under the manhole base.
 - 5. Inverts shall be the same size as the diameter of the largest adjoining pipe. Shape inverts in accordance with the Standard Drawings. Provide a smooth finish.
 - 6. Provide tongue and groove joints sealed with butyl rubber rope for reinforced concrete barrel sections.
 - 7. Construct cast-in-place structures in accordance with ACI 304 and ACI 347.
 - 8. Frames and Covers: Provide frames and covers in the size and type indicated on the Drawings. Set rims of manholes and inlets at finish grade elevation. In paved areas set the rims one-half inch below the pavement surface. Set the rim to match the slope of adjacent paving. Perform final rim adjustment after base course has been placed.
 - 9. Frame/Adjusting Ring Joints: Provide a mortar joint for manholes and field inlets. Dry stack adjusting rings on curb inlets and mortar casting to top ring at time of curb construction.
 - 10. Provide steps for manholes and circular inlets 4-foot diameter or larger. Place steps in vertical alignment, equally spaced at 16" on-center with top step not more than 24 inches from top of casting.

3.07 End Sections

- A. Provide flared end sections on all inlet and outlet ends of storm sewer that do not terminate within a manhole or inlet. Provide prefabricated grates on all end sections for pipes larger than 12-inch diameter. Provide riprap at discharge end as indicated on the drawings.

3.08 Separation from Water Main

- A. Storm sewer mains shall be placed at least 8 feet horizontally (center to center) from any existing or proposed water main. If, due to ledge rock conditions or physical barriers, the Engineer determines that the 8-foot horizontal separation cannot be maintained. The horizontal separation may be reduced to a minimum of 3 feet if the bottom of the water main is at least 18" above the top of the sewer.
- B. The vertical separation for storm sewer mains crossing under water mains shall be such that the elevation from the top of the sewer to the bottom of the water main is at least 6". The vertical separation for storm sewer mains crossing over water mains shall be such that the elevation from the bottom of the sewer to the top of the water main is at least 18".
- C. If an existing water main is encountered while laying the storm sewer and it is impossible to obtain the proper vertical separation, immediately inform the Engineer. Reconstruct the water main for a minimum distance of 8 feet on either side of the storm sewer to permit centering one full length of water main over the storm sewer.

3.09 As-Built Measurements

- A. Provide as-built measurements clearly marked on a clean copy of the Contract Drawings. Tie location of bends and all connections not terminating with a manhole or inlet to ground features to clearly locate the buried construction. As-built measurements are incidental to the Work.

END OF SECTION

SCHUMACHER BARN REMODEL / SITE IMPROVEMENTS

5682 State Hwy 19
 Westport, WI 53597

RFB NO. 316058



PROJECT IMAGE

CODE INFORMATION SUMMARY:

APPLICABLE CODE
 2009 WISCONSIN COMMERCIAL BUILDING CODE
 2009 INTERNATIONAL EXISTING BUILDING CODE

CONSTRUCTION TYPE
 TYPE VB = 1-STORY BUILDING W/ UNOCCUPIED ATTIC ABOVE

OCCUPANCY
 A3 - ASSEMBLY

FIRE SPRINKLER
 BUILDING IS FULLY SPRINKLERED
 NFPA 13 = ENTIRE BUILDING
 - 1ST FLOOR: WET SYSTEM
 - ATTIC: DRY SYSTEM

FIRE RESISTANCE RATING BUILDING ELEMENTS
 STRUCTURAL FRAME (COLUMNS & BEAMS) = 0 HOURS
 BEARING WALLS (EXTERIOR) = 0 HOURS
 NON-BEARING WALLS (EXTERIOR) = 1 HOUR < 10' TO PROPERTY LINE
 NO RATING > 10' TO PROPERTY LINE
 FLOOR = 0 HOURS
 ROOF = 0 HOURS

REQUIRED FIRE BARRIER/PARTITION FIRE RESISTANT RATINGS:
 SHAFTS: 1 HOUR

SEE CODE COMPLIANCE PLAN FOR MORE INFORMATION

PROJECT/BUILDING DATA

RFB NO. 316058 SCHUMACHER BARN REMODEL / SITE IMPROVEMENTS
 ALTERATION OF 1ST FLOOR OF EXISTING BARN - UNOCCUPIED ATTIC SPACE ABOVE TO REMAIN UNCHANGED.

BUILDING AREAS
 EXISTING BUILDING AREA = 5,598 SQFT
 PROPOSED BUILDING AREA = 5,810 SQFT
 (INCLUDES INFILL OF 1ST FLOOR CEILING)

PARKING COUNTS
 SEE CIVIL DRAWINGS

GROSS BUILDING AREAS	
GROUND FLOOR EXISTING	2129 SF
GROUND FLOOR INFILL	2129 SF
LOWER ATTIC EXISTING	1928 SF
LOWER ATTIC INFILL	201 SF
UPPER ATTIC EXISTING	1562 SF
UPPER ATTIC INFILL	1562 SF
TOTAL GROSS AREA	5810 SF

FLOOR AREA	
GROUND FLOOR AREA OF WORK	2053 SF
LOWER ATTIC EXISTING	1863 SF
LOWER ATTIC INFILL OF EXISTING OPENINGS	201 SF
UPPER ATTIC EXISTING	1495 SF
UPPER ATTIC INFILL	1495 SF
TOTAL AREA	5612 SF

PLUMBING FIXTURES					
REQUIRED FIXTURES	MEN		WOMEN		FIXTURES PROVIDED
	WC	LAV	WC	LAV	
WC	1	2	1	3	
LAV	1	1	1	1	
UR	-	-	2	-	
TOTAL OCCUPANTS: 159 MEN: 80 WOMEN: 80 PER IFC 2009 TABLE 403.1					

Architecture :

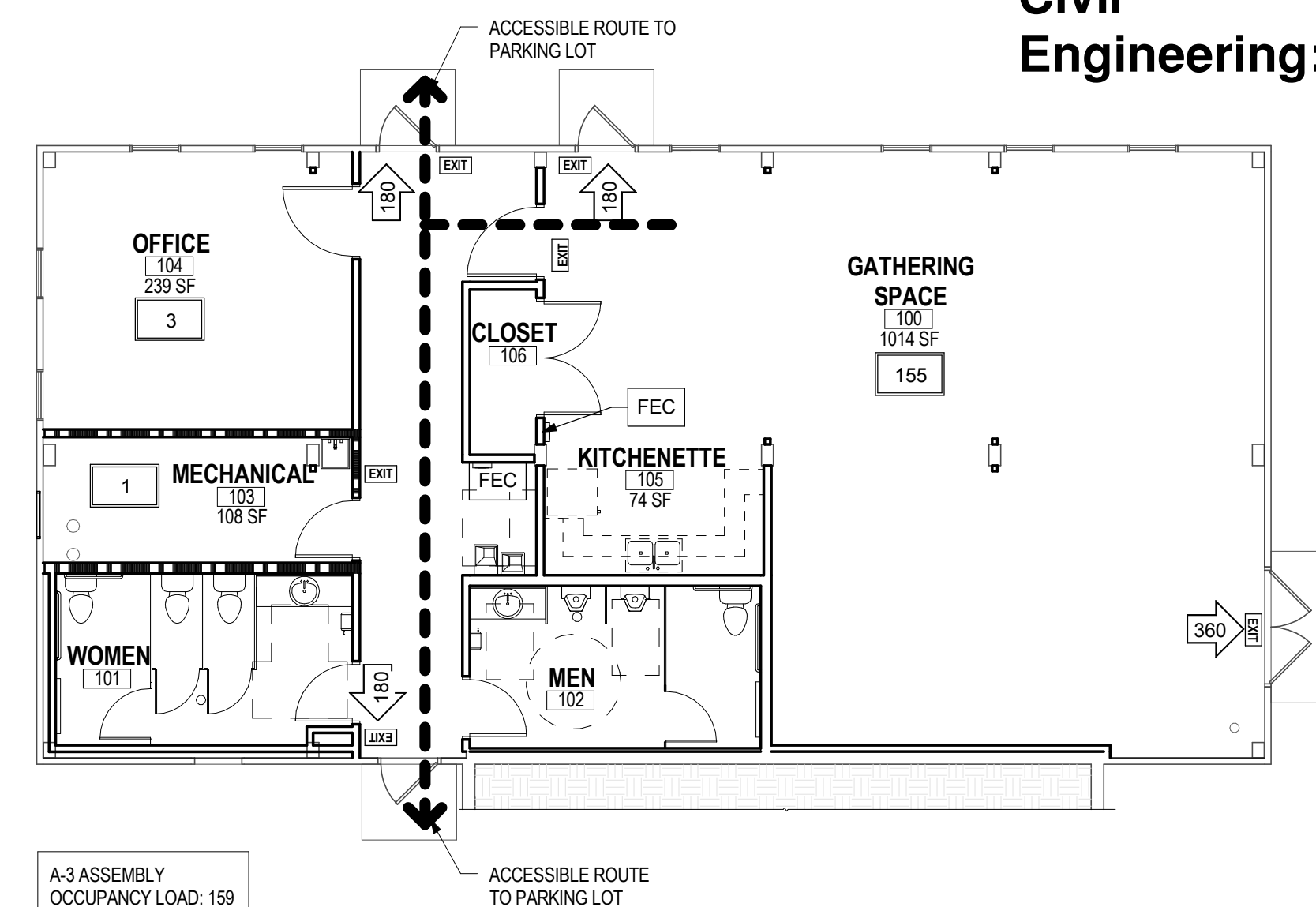
MEP Engineering:

Civil Engineering:

Dimension IV - Madison Design Group
 6515 Grand Teton Plaza, Suite 120, Madison, WI 53719
 p: 608.829.4444 www.dimensionivmadison.com

Hein Engineering Group
 17 Applegate Court, Suite 200, Madison, WI 53713
 p: 608.288.9260

General Engineering Company
 916 Silver Lake Dr, Portage, WI 53901
 p: 608.742.2169 www.generalengineering.net



1 CODE COMPLIANCE - FIRST FLOOR
 1/8" = 1'-0"

CODE COMPLIANCE GENERAL NOTES

A. GRAB BARS: (PER 2003 ICC/ANSI A117.1)
 INSTALLED GRAB BARS AT TOILETS WITH BLOCKING (INCLUDING VERTICAL GRAB BAR)

B. REFER TO SHEET A7.0 FOR ACCESSIBLE MOUNTING AND CLEARANCES INFORMATION.

C. ALL FIRE EXTINGUISHER CABINETS SHALL BE IN APPROVED LOCATIONS WITH A MAXIMUM TRAVEL DISTANCE TO EXTINGUISHER TO BE 75 FEET PER I.F.C.

D. EXIT ACCESS TRAVEL DISTANCE IS 250 FEET WITH SPRINKLERS PER TABLE 1016.1.

E. COMMON PATH OF EGRESS TRAVEL SHALL NOT EXCEED 75 FEET PER 1014.3.

CODE COMPLIANCE SYMBOLS LEGEND

FEC	INDICATES FIRE EXTINGUISHER CABINET LOCATION
XXX	INDICATES OCCUPANCY CAPACITY
---	INDICATES ADA ACCESSIBLE ROUTE
XXX	INDICATES EXIT AND EXIT CAPACITY
---	INDICATES 1 HOUR FIRE RATED WALL (SEC 709)

LIST OF DRAWINGS

- GENERAL**
 G0.1 COVER SHEET
- CIVIL**
 G1.0 TITLE PAGE
 G1.1 LEGEND & NOTES
 C1.0 EXISTING SITE PLAN
 C2.0 OVERALL PROPOSED SITE PLAN
 C2.1 PROPOSED SITE PLAN
 C3.0 PROPOSED GRADING SITE PLAN
 C4.0 UTILITY SITE PLAN
 C4.1 STORMWATER DEVICES DETAILS
 C5.0 SPOT ELEVATION SITE PLAN-ROAD
 C5.1 SPOT ELEVATION SITE PLAN-PROJECT
 C6.0 MISC. CONSTRUCTION DETAILS
 C7.0 WATERMAIN CONSTRUCTION DETAILS
 C8.0 EROSION CONTROL DETAILS
 C9.0 EROSION CONTROL SPECIFICATIONS

- ARCHITECTURAL**
 A1.1 FLOOR PLANS AND REFLECTED CEILING PLAN
 A3.0 BUILDING SECTIONS
 A5.0 RESTROOM PLANS AND KITCHENETTE ELEVATIONS
 A6.0 DOOR AND WALL TYPES AND SCHEDULES
 A7.0 INTERIOR ELEVATIONS
 A9.0 FLOOR FINISH PLAN

LIST OF DRAWINGS

- FIRE PROTECTION**
 FP1.1 GROUND FLOOR PLAN - FIRE PROTECTION
 FP1.2 ATTIC FLOOR PLANS - FIRE PROTECTION
- PLUMBING**
 P1.1 FLOOR PLANS - PLUMBING
 P2.0 PLUMBING RISERS, SCHEDULES & DETAILS
- HVAC**
 H1.1 GROUND FLOOR PLANS - HVAC
 H1.2 ATTIC FLOOR PLANS - HVAC
 H1.3 GROUND FLOOR PLAN - RADIANT HEAT
 H2.0 HVAC SCHEDULES
 H3.0 HVAC DETAILS
- ELECTRICAL**
 E1.1 GROUND FLOOR PLANS - ELECTRICAL
 E1.2 ATTIC FLOOR PLANS - ELECTRICAL
 E2.0 ELECTRICAL SCHEDULES
 E3.0 ELECTRICAL DETAILS
 SE1.0 SITE ELECTRICAL PLAN



PROJECT LOCATION

AREA MAP

PROJECT # 14099

CONSTRUCTION SET

04/25/2017

G0.1



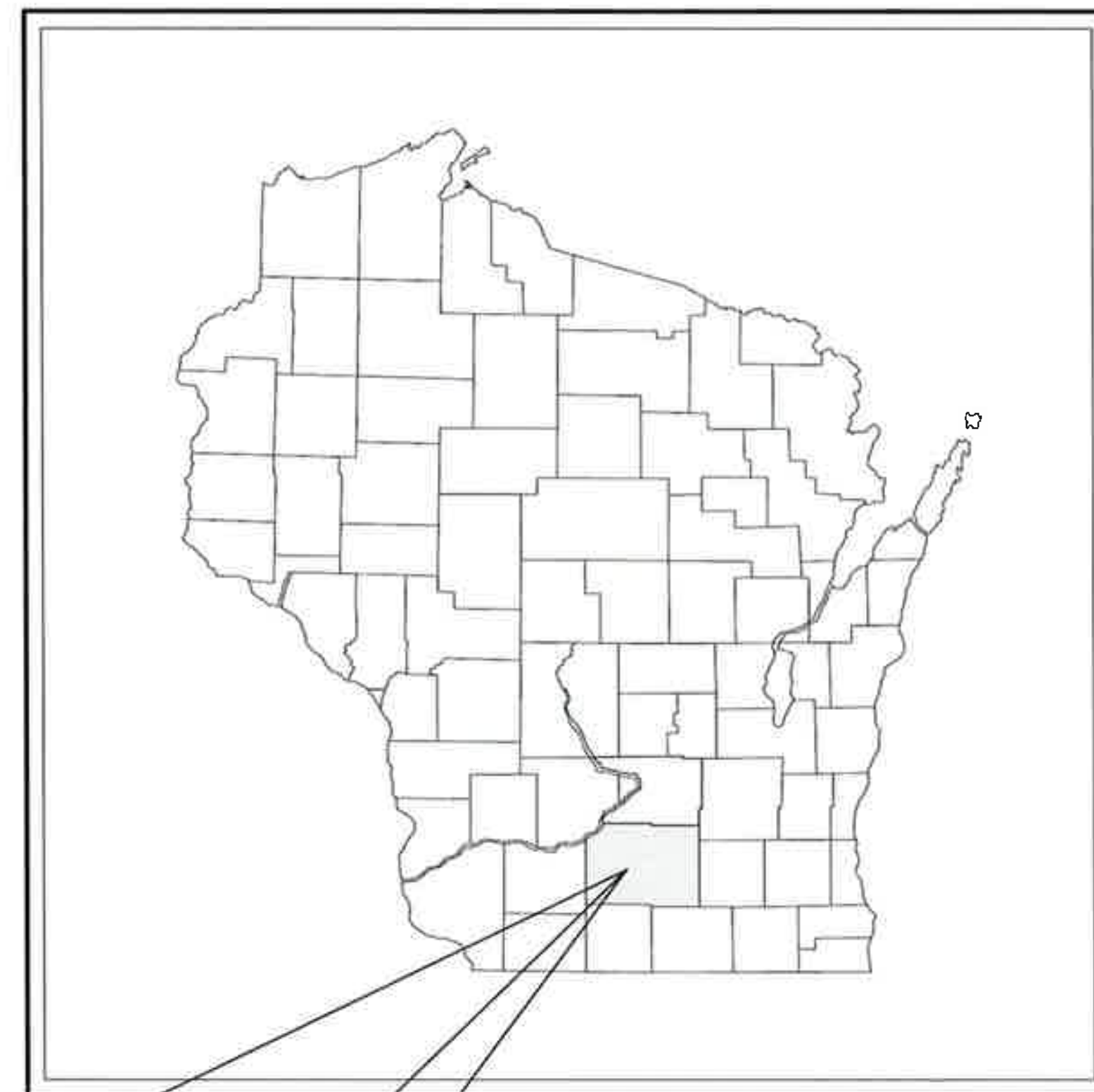
SCHUMACHER FARM CENTER FOR RURAL HERITAGE

Dane County Parks
Town of Westport
Dane County, WI
March 2016

General Engineering Company

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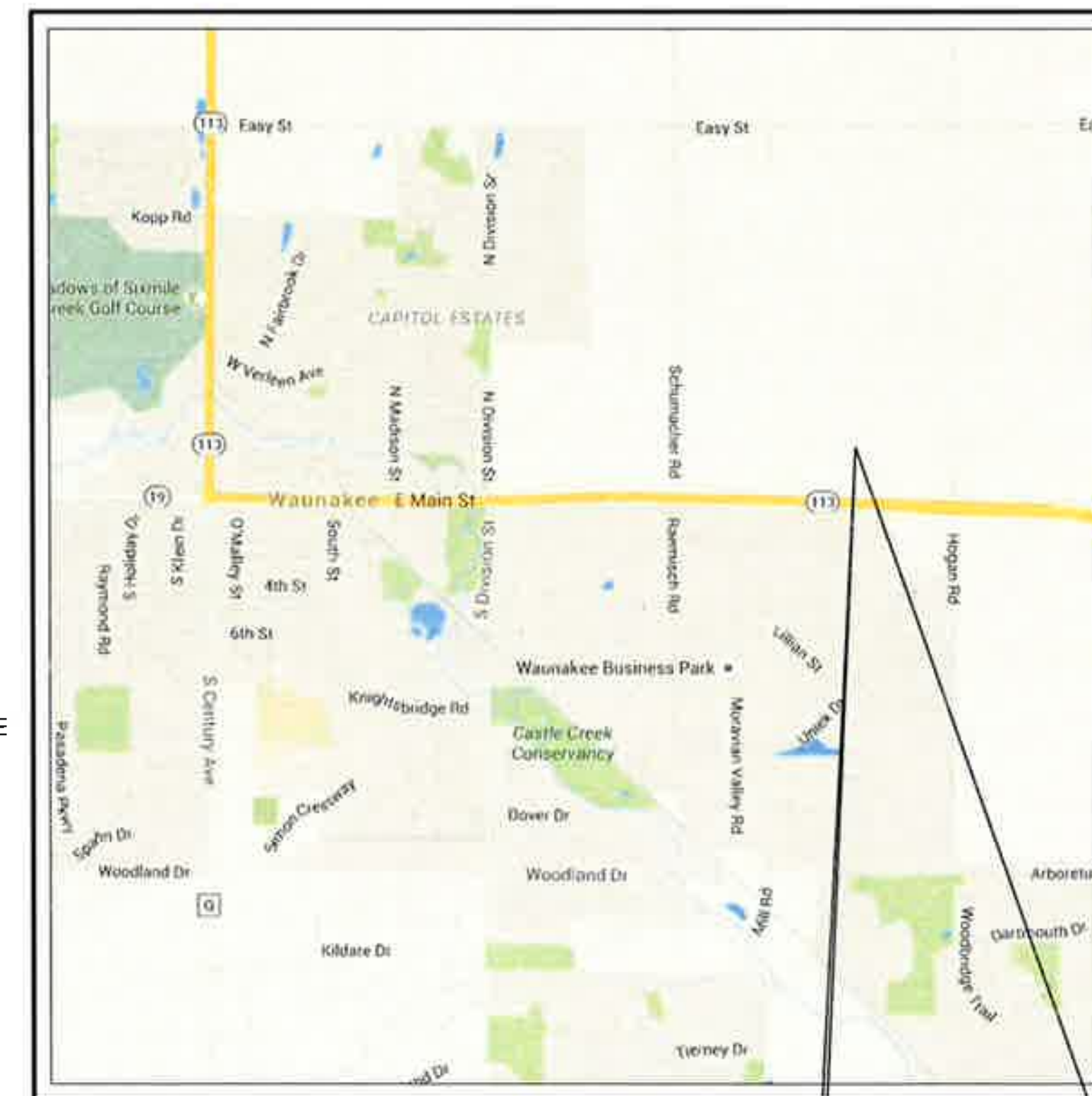
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PROJECT LOCATION



NO SCALE



TOWN OF WESTPORT
LOCATION PLAN

PROJECT LOCATION

TABLE OF CONTENTS:

GENERAL

- G1.0 TITLE PAGE
- G1.1 LEGEND & NOTES

CIVIL

- C1.0 EXISTING SITE PLAN
- C2.0 OVERALL PROPOSED SITE PLAN
- C2.1 PROPOSED SITE PLAN
- C3.0 PROPOSED GRADING SITE PLAN
- C4.0 UTILITY SITE PLAN
- C4.1 STORMWATER DEVICES DETAILS
- C5.0 SPOT ELEVATION SITE PLAN-ROAD
- C5.1 SPOT ELEVATION SITE PLAN-PROJECT
- C6.0 MISC. CONSTRUCTION DETAILS
- C7.0 WATERMAIN CONSTRUCTION DETAILS
- C8.0 EROSION CONTROL DETAILS
- C9.0 EROSION CONTROL SPECIFICATIONS

TITLE PAGE
Schumacher Farm Center for Rural Heritage

Town of Westport
Dane County, WI

REVISIONS	NO.	BY	DATE
Utility Location Update	1	LAL	09/12/2017
Bidding Documents	2	LAL	05/09/2017



DRAWN BY	LAL
REVIEWED BY	KDA
ISSUE DATE	March 2016
GEC FILE NO.	2-0116-72
SHEET NO.	G1.0



CONSTRUCTION NOTES

GENERAL

1. ALL EXISTING UNDERGROUND UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED, BY CONTRACTOR, PRIOR TO CONSTRUCTION.

WATER MAIN

1. EXISTING WATER MAIN LOCATIONS, SIZES, AND TYPES SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO MAKING ANY CONNECTIONS.
2. UNLESS OTHERWISE INDICATED BY DESIGN GRADE, MAINTAIN A 7.0' MINIMUM DEPTH OF COVER OVER PROPOSED WATER MAIN AND WATER MAIN LATERALS.
3. UNLESS OTHERWISE INDICATED FOR WATER MAIN CROSSINGS BELOW STORM SEWER & SANITARY SEWER PIPES CONTRACTOR SHALL MAINTAIN A MINIMUM 18" OF SEPARATION FROM EDGE OF PIPE TO EDGE OF PIPE.

STORM SEWER

1. STORM SEWER PIPE LENGTHS ARE SHOWN MEASURED FROM OUTSIDE OF STRUCTURE TO OUTSIDE OF STRUCTURE.

GRADING & EROSION CONTROL NOTES

1. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO CONSTRUCTION.
2. SILT FENCE, TEMPORARY SEDIMENT BASIN, & ROCK CONSTRUCTION ENTRANCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES, INCLUDING CLEARING & GRUBBING.
3. ALL STORM SEWER INLETS SHALL HAVE INLET PROTECTION TYPE-D INSTALLED UPON INLET INSTALLATION.
4. CONTRACTOR IS RESPONSIBLE FOR WEEKLY DNR INSPECTION REPORTS IN ACCORDANCE WITH NR 216.46(9).
5. ADDITIONAL EROSION CONTROL MEASURES MAY BE ADDED ON AN AS-NEEDED BASIS.
6. THE POND SHALL BE CONSTRUCTED PRIOR TO MASS LAND DISTURBANCE.
7. ANY AREAS WHERE GRADING IS COMPLETE SHALL BE STABILIZED WITH FERTILIZER, SEED, & MULCH AS SOON AS POSSIBLE.
8. ALL BEST MANAGEMENT PRACTICES WILL BE INSTALLED BY THE TIME THE CONSTRUCTION SITE IS CONSIDERED STABILIZED.
9. A COPY OF THIS EROSION CONTROL PLAN SHALL BE KEPT ON SITE THROUGHOUT THE DURATION OF THE PROJECT.
10. STOCKPILES LEFT INACTIVE FOR 7 DAYS SHALL BE SEEDED AND SURROUNDED BY SILT FENCE.
11. ALL WASTE AND UNUSED BUILDING MATERIALS (INCLUDING GARBAGE, DEBRIS, CLEANING WASTES, OR OTHER CONSTRUCTION MATERIALS) SHALL BE PROPERLY DISPOSED OF AND NOT ALLOWED TO BE CARRIED BY RUNOFF INTO RECEIVING CHANNEL.
12. ALL VEHICLE TRAFFIC IS PROHIBITED WITHIN THE UNDISTURBED LAND BUFFER WHENEVER PRACTICAL.
13. EROSION CONTROL MAT CLASS I, TYPE A WILL BE USED IN NON-CHANNEL AREAS AND CLASS I, TYPE B WILL BE USED IN CHANNEL AREAS.
14. ALL DEWATERING PERMITTING, IF REQUIRED, IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE IN ACCORDANCE WITH DNR TECHNICAL STANDARD 1061.
15. STREETS SHALL BE SWEEPED AT THE END OF EACH WORK DAY OR AS DIRECTED BY THE MUNICIPALITY.
16. TRACKING PADS SHALL BE USED AT THE CONSTRUCTION ENTRANCE AND EXITS.
17. ALTHOUGH ROCK CONSTRUCTION TRACKING PADS MAY NOT BE SHOWN ON THE PLANS, THE CONTRACTOR SHALL INSTALL THEM AS NECESSARY OR AS DIRECTED BY THE ENGINEER TO MINIMIZE TRACKING ONTO ADJACENT STREETS. THESE PADS ARE CONSIDERED INCIDENTAL TO THE WORK AND WILL NOT BE MEASURED OR PAID FOR SEPARATELY.
18. CONTRACTOR WILL BE RESPONSIBLE FOR ALL DUST CONTROL.
19. ALL BANK AREAS DISTURBED SHALL BE STABILIZED WITH EROSION CONTROL MAT IMMEDIATELY.
20. POSITIVE DRAINAGE AWAY FROM THE BUILDING WILL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS OTHERWISE CONFIRMED BY THE ENGINEER.
21. DOWN SPOUTS SHALL BE DIRECTED IN A SAFE MANNER AND COMPLY WITH ALL LOCAL AND STATE REGULATIONS.
22. ALL FILL PLACED UNDER BUILDING AND PAVED AREAS SHALL BE STRUCTURALLY SOUND.
23. SEDIMENT WILL BE REMOVED FROM BEHIND SEDIMENT FENCES AND BARRIERS BEFORE IT REACHES A DEPTH THAT IS EQUAL TO HALF THE BARRIER'S HEIGHT.
24. BREAKS AND GAPS IN SEDIMENT FENCES AND BARRIERS WILL BE REPAIRED IMMEDIATELY. DECOMPOSING STRAW BALES WILL BE REPLACED (TYPICAL BALE LIFE IS THREE MONTHS).
25. ALL SEDIMENT THAT MOVES OFF-SITE DUE TO CONSTRUCTION ACTIVITY OR STORM EVENTS WILL BE CLEANED UP BEFORE THE END OF THE SAME WORKDAY.
26. ALL INSTALLED EROSION CONTROL PRACTICES WILL BE MAINTAINED UNTIL THE DISTURBED AREAS THEY PROTECT ARE STABILIZED.
27. ALL EROSION CONTROL MAT SHALL BE INSTALLED WITHIN 24 HOURS OF FINAL GRADES BEING ESTABLISHED.

EXISTING LINETYPES LEGEND

- San — SANITARY SEWER
- ST — STORM SEWER
- WM — WATER MAIN
- FM — FORCE MAIN
- E — ELECTRIC
- OE — OVERHEAD ELECTRIC
- G — GAS
- FO — FIBER OPTIC
- T — TELEPHONE
- TV — TV
- X — FENCE
- GR — GUARD RAIL
- GL — GRADING LIMITS
- SF — SILT FENCE
- DB — DOUBLE SEDIMENT BARRIER
- TR — TRAIN TRACKS
- TRE — TREELINE

SYMBOLS LEGEND

- EXISTING MANHOLE
- PROPOSED MANHOLE
- EXISTING HYDRANT
- PROPOSED HYDRANT
- ⊗ VALVE
- ⊗ CURB STOP
- ⊗ TRACER WIRE TERMINAL BOX
- △ WELL
- PROPERTY CORNER
- LIGHT POLE
- POWER / TELEPHONE POLE
- GUY WIRE
- UTILITY PEDESTAL
- SIGN
- ⊗ SOIL BORING
- ⊗ MONITORING WELL
- ⊗ MAILBOX
- ⚠ POTENTIAL HAZARD
- ⊗ BENCHMARK
- ⊗ GEC-CP # CONTROL POINT
- ⊗ DECIDUOUS TREE
- ⊗ CONIFEROUS TREE
- ♿ HANDICAP SYMBOL

ABBREVIATION LIST

- B-B = BACK TO BACK
- BOC = BACK OF CURB
- BOP = BOTTOM OF PIPE
- BOW = BOTTOM OF WALL
- C-C = CENTER TO CENTER
- CL = CENTERLINE
- CP = CONTROL POINT
- DIA = DIAMETER
- ELEV = ELEVATION
- EOG = EDGE OF GRAVEL
- EOP = EDGE OF PAVEMENT
- EX = EXISTING
- FL = FLOW LINE
- FM = FORCE MAIN
- HC = HORIZONTAL CURVE
- HP = HIGH POINT
- IE = INVERT ELEVATION
- INL = INLET
- INV = INVERT
- IOS = INSIDE OF STRUCTURE
- L = LENGTH
- LN = LINE
- LP = LOW POINT
- MH = MANHOLE
- MIN = MINIMUM
- MP = MIDPOINT
- PC = POINT OF CURVE
- PI = POINT OF INTERSECTION
- PRO = PROPOSED
- PT = POINT OF TANGENT
- PVC = POINT OF VERTICAL CURVE
- PVI = POINT OF VERTICAL INTERSECTION
- PVMT = PAVEMENT
- PVT = POINT OF VERTICAL TANGENT
- R = RADIUS
- ROW = RIGHT OF WAY
- S = SANITARY SEWER SERVICE LATERAL
- SAN = SANITARY SEWER
- SE = SPOT ELEVATION
- ST = STORM SEWER
- STA = STATION
- STD = STANDARD
- TC = TOP OF CURB
- TOP = TOP OF PIPE
- TOW = TOP OF WALL
- TYP = TYPICAL
- UOS = UNLESS OTHERWISE SPECIFIED
- VC = VERTICAL CURVE
- W = WATER MAIN SERVICE LATERAL
- WM = WATER MAIN

DIGGERS HOTLINE NOTE

To Obtain Location of Participants Underground Facilities Before You Dig in Wisconsin

CALL DIGGERS HOTLINE 1-800-242-8511

Wis Statute 182.0175 (1974)
Requires Min. 3 Work Days Notice Before You Excavate.

OWNER

DANE COUNTY PARKS
5201 FEN OAK COURT, ROOM 208
MADISON WI 53718-8812
PHONE: (608) 224-3730

UTILITIES

- | | |
|---|--|
| 1. ELECTRIC
MGE
133 S. Blair St
Madison, WI 53788
PHONE: (608) 441-2800 | 4. CABLE TV
CHARTER COMMUNICATION
2710 Daniels St
Madison, WI
PHONE: (608) 284-8056 |
| 2. TELEPHONE
TDS
103 Bacon St
Waunakee, WI 53597
PHONE: (888) 225-5837 | 5. WATER & SEWER
WAUNAKEE UTILITIES
322 Moravian Valley Rd.
Waunakee WI, 53597
PHONE: (608) 849-8111 |
| 3. GAS
MGE
133 S. Blair St
Madison, WI 53788
PHONE: (608) 441-2800 | |



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LEGEND & NOTES
Schumacher Farm Center for Rural Heritage

Town of Westport
Dane County, WI

REVISIONS	NO.	BY	DATE
Utility Location Update	1	LAL	09/13/2017
Bidding Documents	2	LAL	05/09/2017



DRAWN BY	LAL
REVIEWED BY	KDA
ISSUE DATE	3/11/2016
GEC FILE NO.	2-0116-72
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BENCHMARK TABLE

BENCHMARK	DESCRIPTION	ELEVATION
TBM #1	TOP NUT ON HYDRANT, SE CORNER OF ROAD AND ROAD	994.53'
CP #2	EDGE OF GRAVEL DRIVEWAY, NORTH PART OF THE ROAD	1012.54
CP #3	GROUND, S SIDE OF RAMP	1011.28

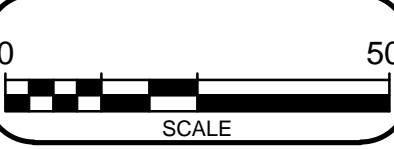


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EXISTING SITE PLAN
 Schumacher Farm Center for Rural Heritage

Town of Westport
 Dane County, WI

REVISIONS	NO.	BY	DATE
Utility Location Update	1	LAL	03/13/2017
Bidding Documents	2	LAL	05/09/2017



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 SHEET NO.

NOTES:

1. ALL EXISTING UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
2. ALL GENERAL NOTES FOUND ON SHEET G1.1.



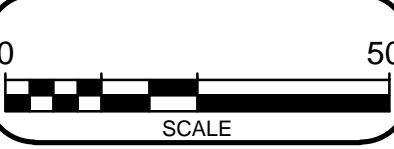
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OVERALL PROPOSED SITE PLAN
 Schumacher Farm Center for Rural Heritage

Town of Westport
 Dane County, WI

REVISIONS	NO.	BY	DATE
Utility Location Update	1	LAL	03/13/2017
Bidding Documents	2	LAL	05/09/2017

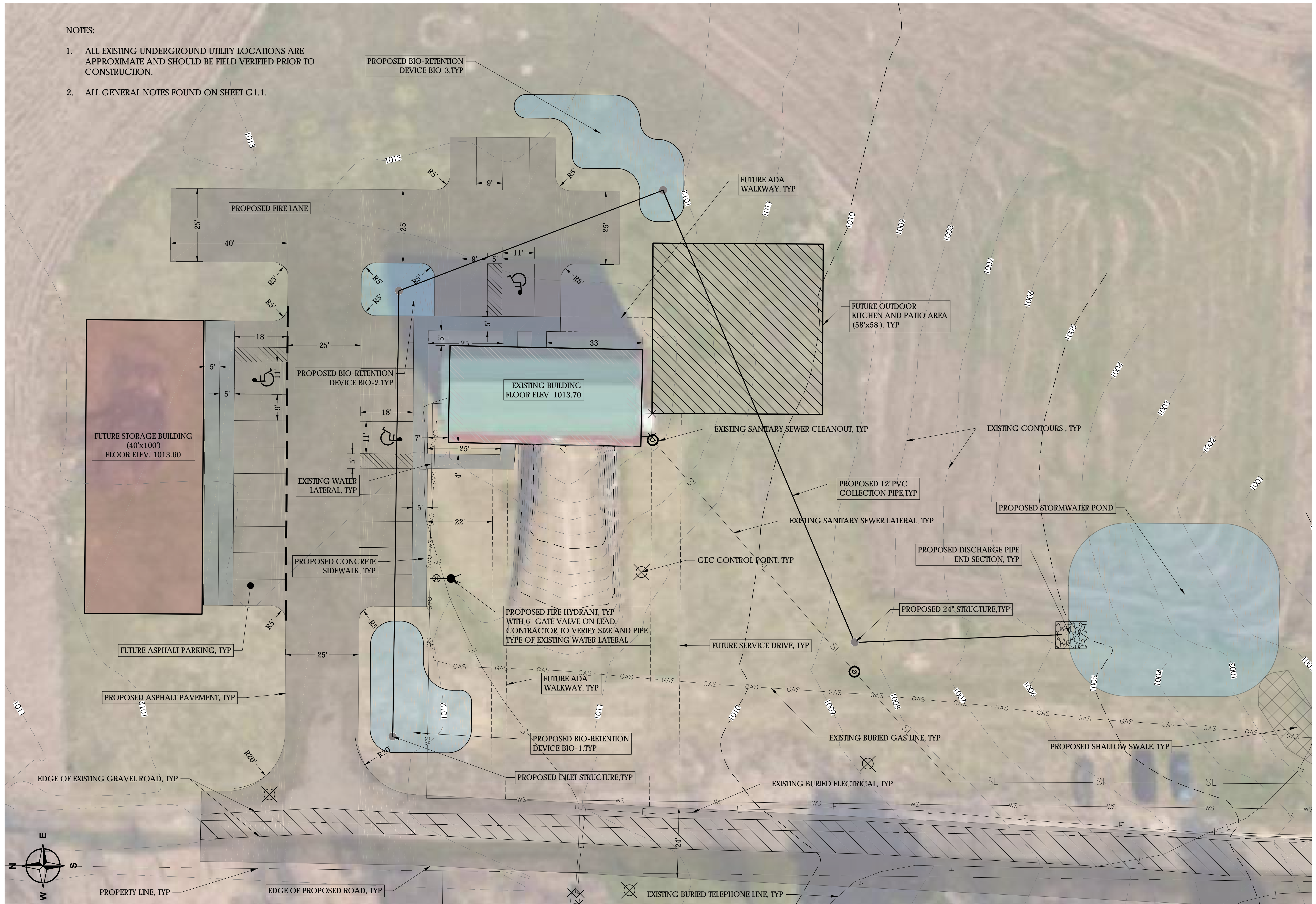


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C2.0

NOTES:

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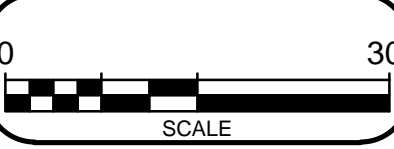


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PROPOSED SITE PLAN
 Schumacher Farm Center for Rural Heritage
 Town of Westport
 Dane County, WI

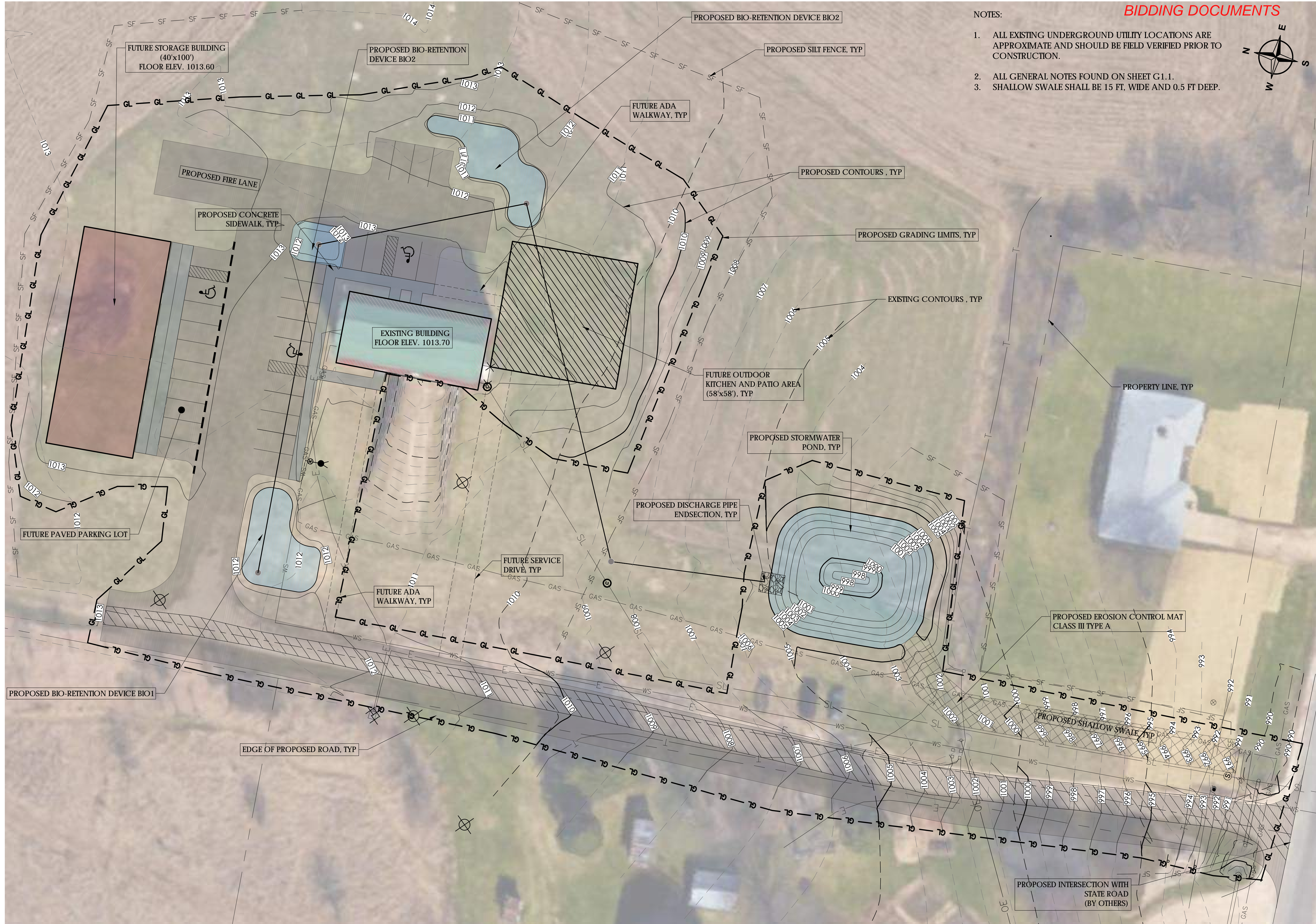
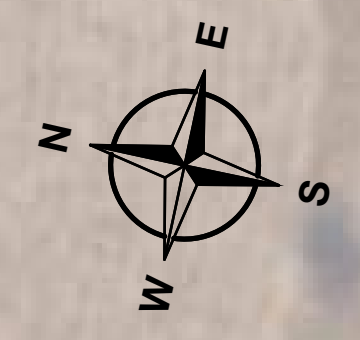
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NOTES:

1. ALL EXISTING UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
2. ALL GENERAL NOTES FOUND ON SHEET G1.1.
3. SHALLOW SWALE SHALL BE 15 FT. WIDE AND 0.5 FT DEEP.

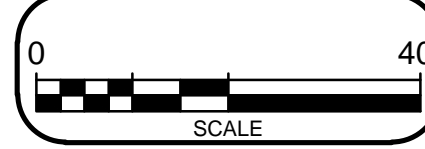


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PROPOSED GRADING SITE PLAN
 Schumacher Farm Center for Rural Heritage

Town of Westport
 Dane County, WI

REVISIONS	NO.	BY	DATE
Bidding Documents	1	LAL	05/09/2017



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 GEC FILE NO.: 2-0116-72
 SHEET NO.:

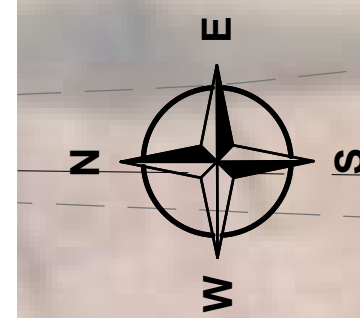
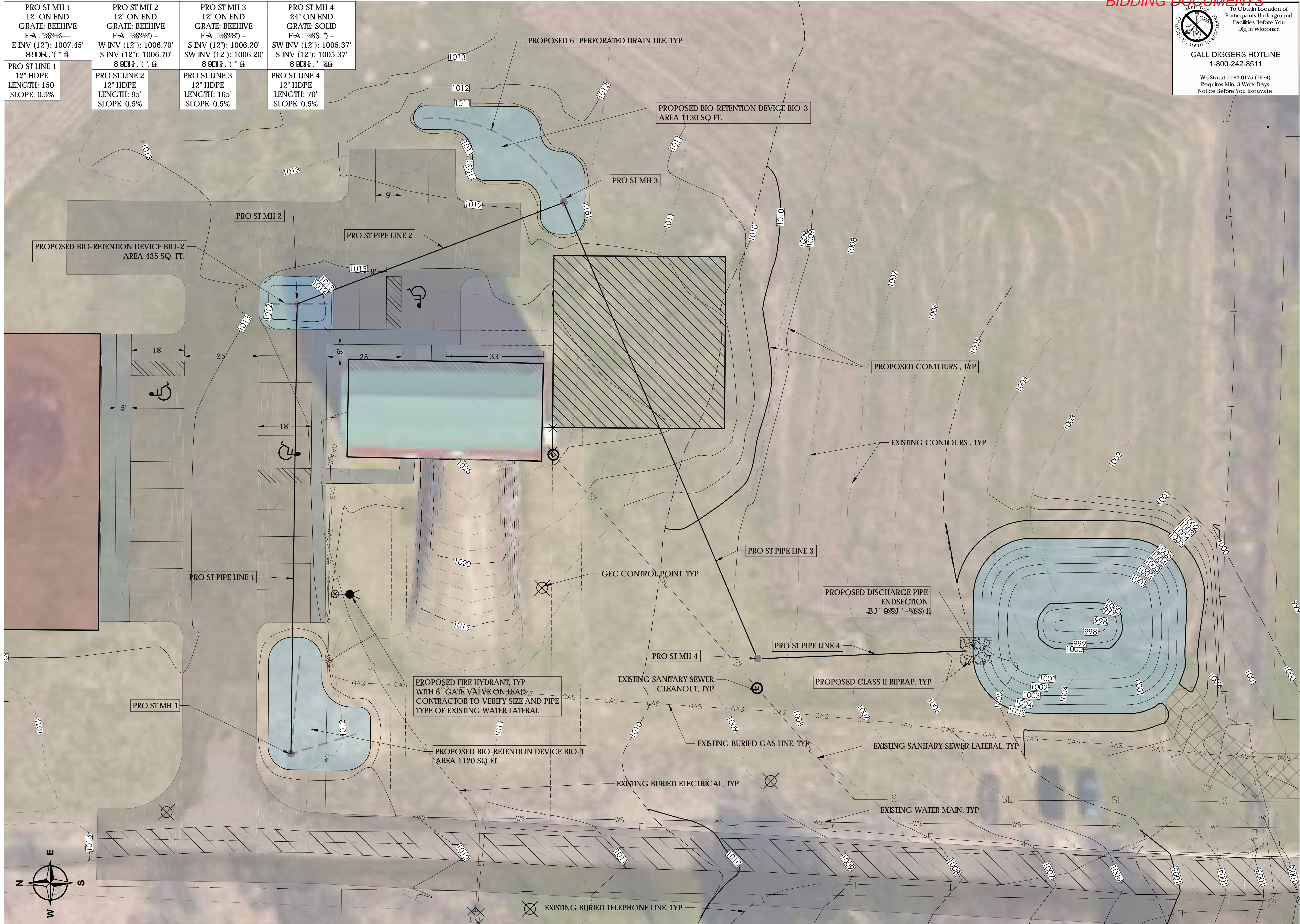
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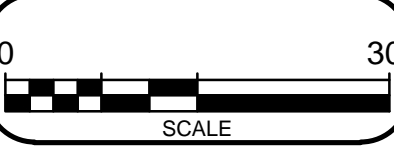
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UTILITY SITE PLAN
Schumacher Farm Center for Rural Heritage

Town of Westport
 Dane County, WI



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SHEET NO.	

C4.0



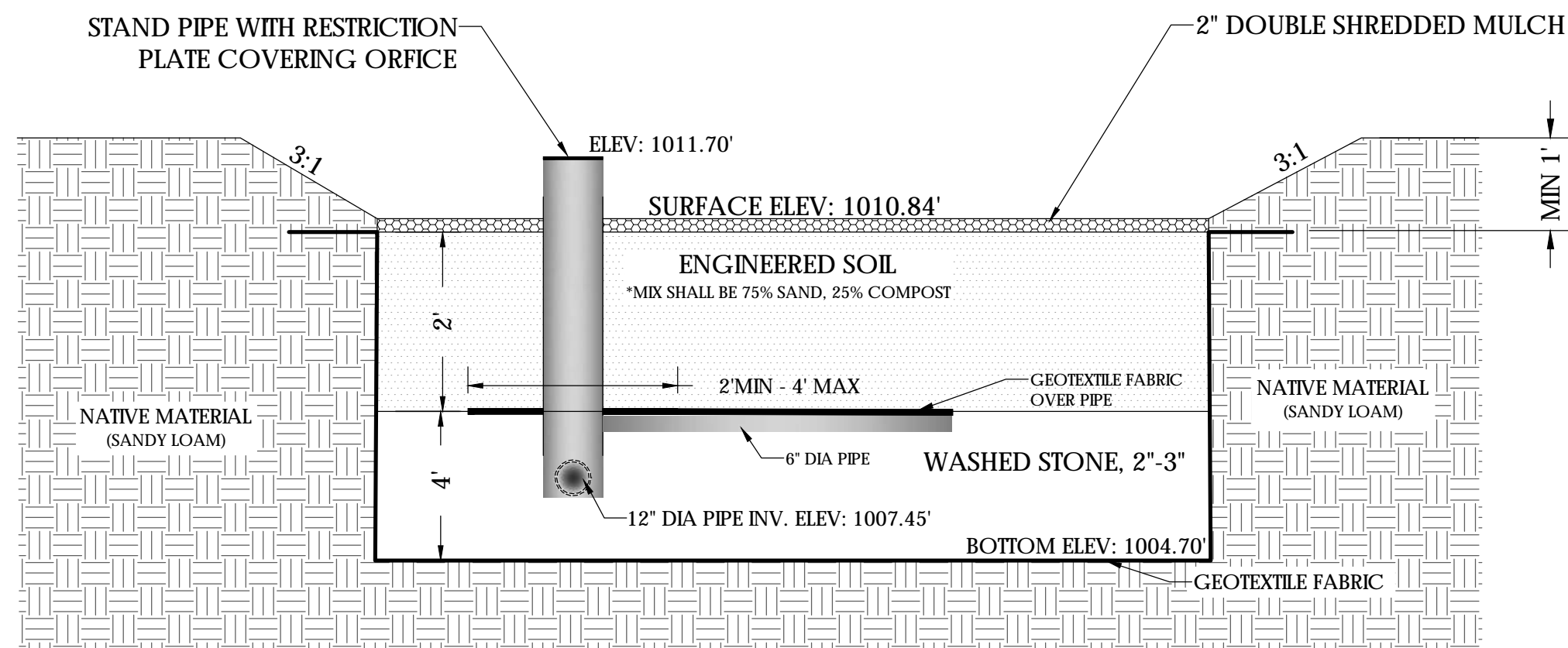
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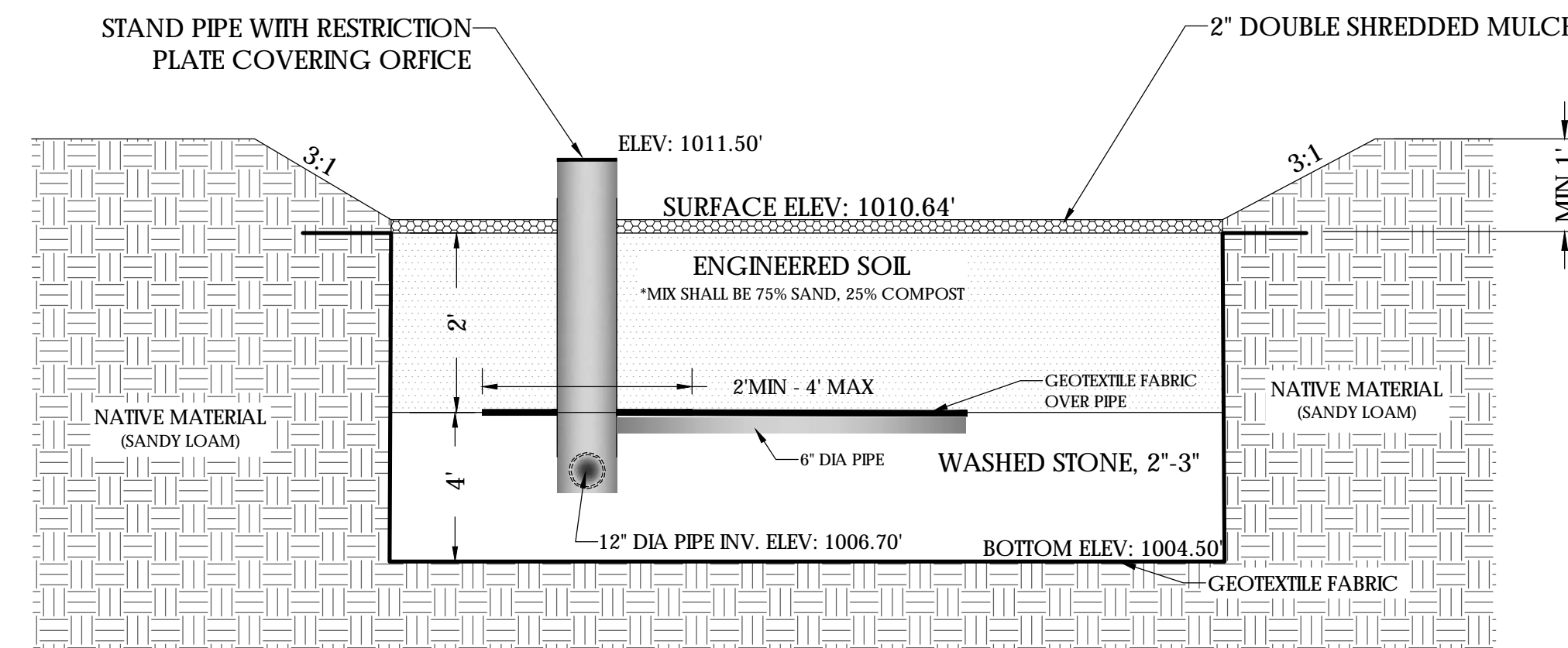
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STORMWATER DEVICES DETAILS
Schumacher Farm Center for Rural Heritage

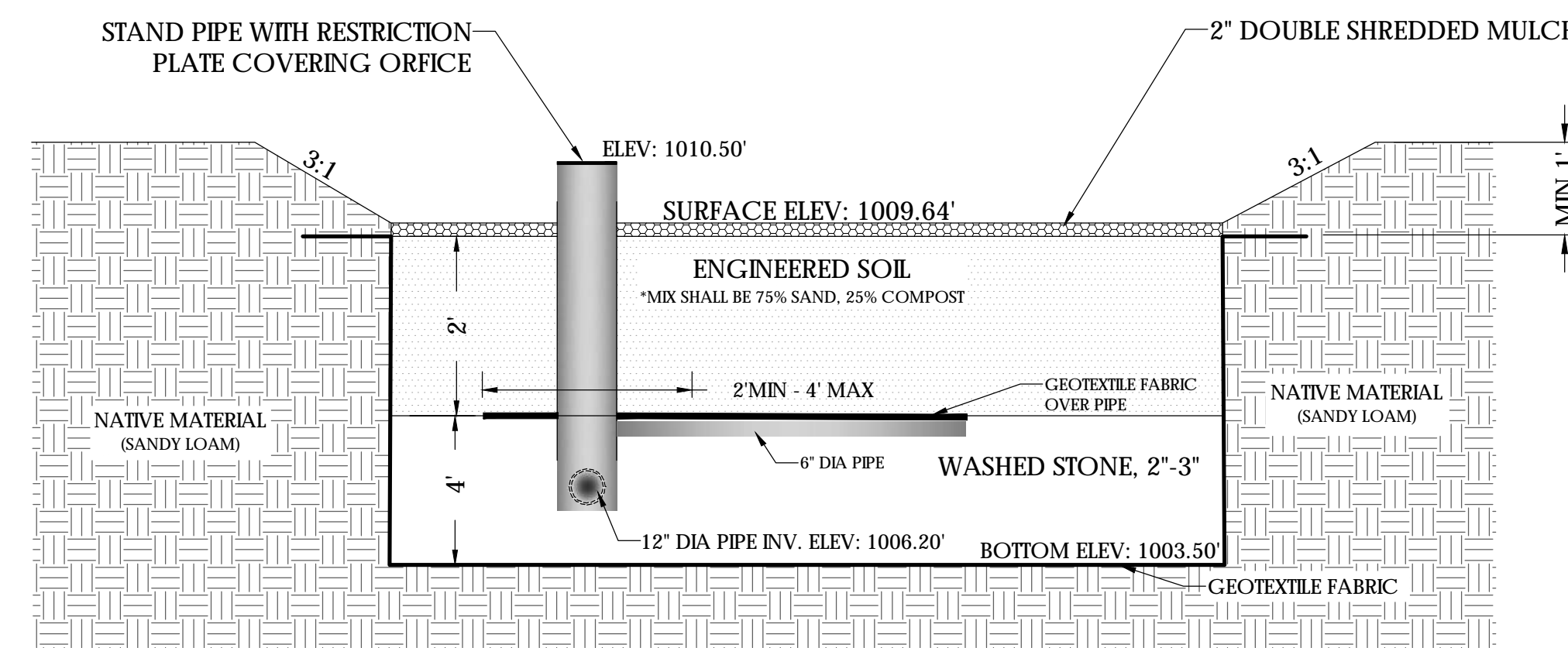
Town of Westport
Dane County, WI



BIOFILTRATION DEVICE CROSS SECTION BIO-1



BIOFILTRATION DEVICE CROSS SECTION BIO-2

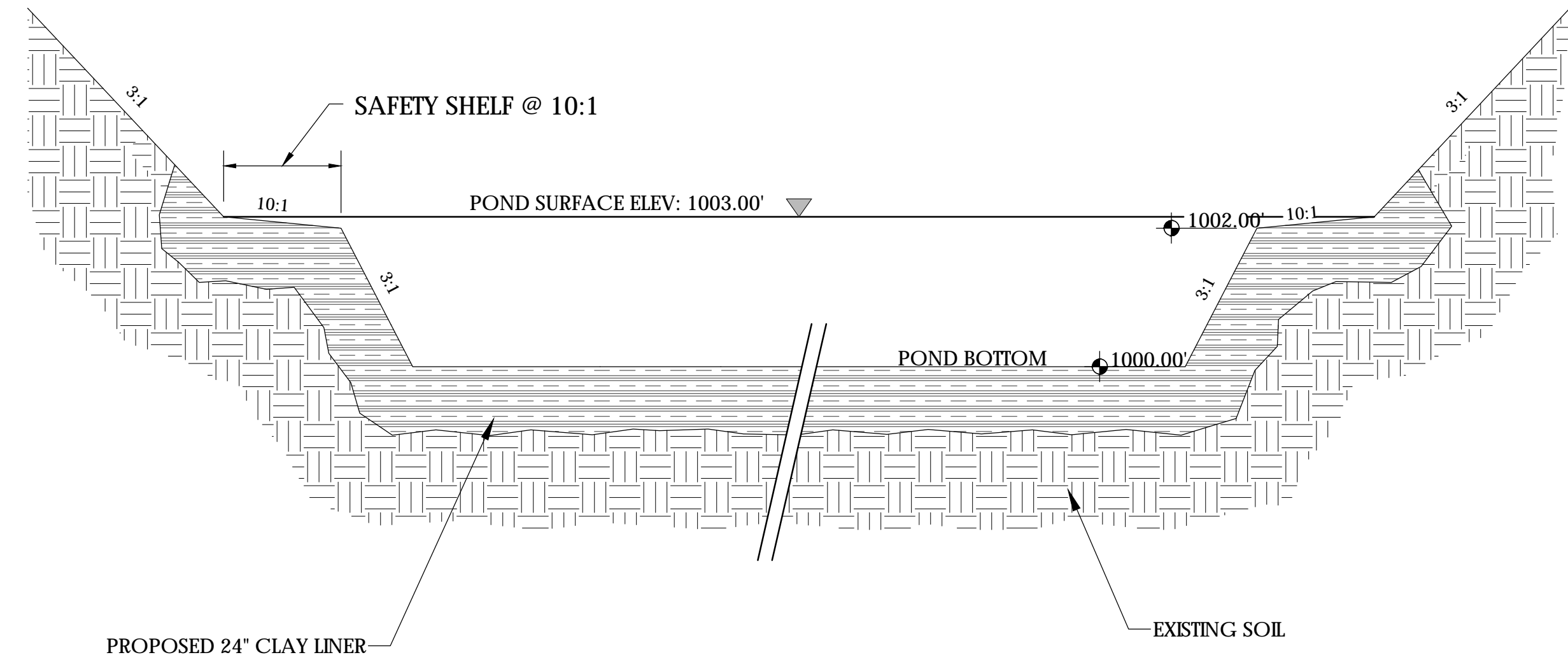


BIOFILTRATION DEVICE CROSS SECTION BIO-3

NOTES:

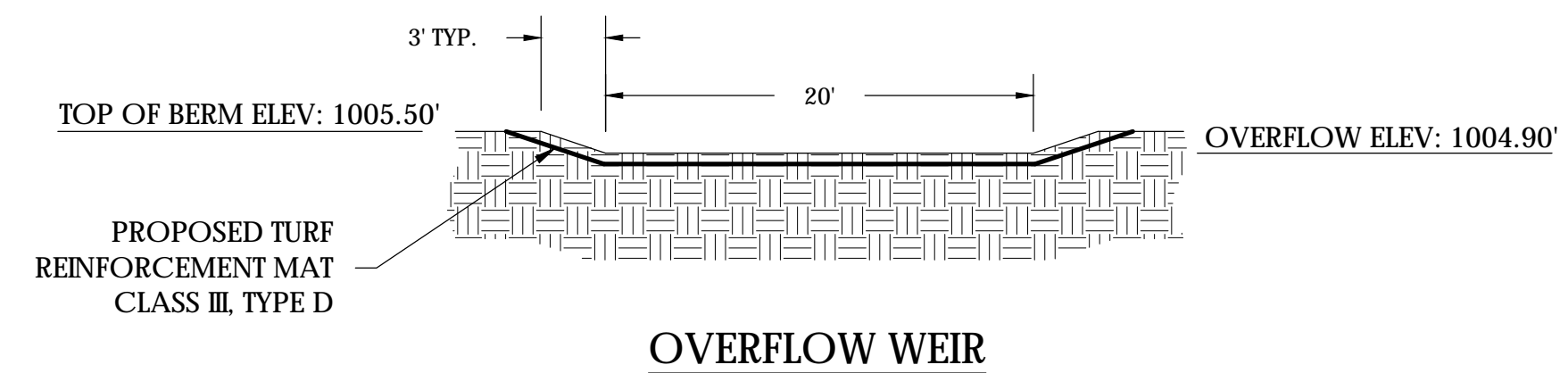
1. RUNOFF SHALL NOT BE ALLOWED IN THE BASIN UNTIL AFTER THE TRIBUTARY AREA IS STABILIZED.
2. CONSTRUCTION OF THE BASIN SHOULD ONLY OCCUR DURING SUITABLE SITE CONDITIONS - IF CONSTRUCTION OF THE BASIN OCCURS DURING SATURATED SOIL CONDITIONS, THE SOIL IN THE DEVICE COULD BE UNNECESSARILY COMPACTED.
3. EXCESS SEDIMENT IN THE BIORETENTION BASIN SHALL BE REMOVED AT THE END OF CONSTRUCTION.
4. COMPACTION OF THE SOILS USED FOR THE BIORETENTION DEVICE MUST BE AVOIDED - HEAVY EQUIPMENT SHOULD NOT BE USED IN THE CONSTRUCTION OF THE BASIN AND ONLY TRACKED EQUIPMENT SHALL BE PERMITTED IN THE BASIN.
5. THE ENGINEERED SOIL SHALL BE PREMIXED PRIOR TO PLACEMENT AND DRY ENOUGH TO PREVENT CLUMPING AND COMPACTION.
6. THE BASIN SHALL BE MULCHED WITH 2" THICK DOUBLE SHREDDED MULCH BEFORE THE PLANTING OF THE VEGETATION IN ORDER TO PREVENT COMPACTION.
7. THE MATERIALS USED FOR THE ENGINEERED SOIL SHALL COMPLY WITH WISCONSIN DNR TECHNICAL STANDARD 1004.
8. LIVE PLANT PLUGS GROWN TO AT LEAST 1.25" x 1.25" x 2.25" IN POTS SHALL BE PLANTED AT 1' ON CENTER THROUGHOUT THE PLANTING AREA. PLANTING SHALL BE CONDUCTED WHEN CONSTRUCTION ACTIVITIES HAVE CEASED.
9. PLANTS SHALL BE NATIVE PLANTS AS SPECIFIED BY AGRECOL OR OTHER APPROVED NURSERY.
10. CLASS II RIPRAP WITH GEOTEXTILE FABRIC SHALL BE PROVIDED AT ALL INLETS WITH CONCENTRATED FLOWS TO PREVENT EROSION OF THE MULCH AND ENGINEERED SOIL NEAR INLETS.
11. BIORETENTION BASIN SHALL BE DEEP TILLED AT THE END OF CONSTRUCTION PRIOR TO MULCHING AND PLANTING.
12. BIORETENTION BASIN SHALL BE WATERED TWICE A WEEK (IF NO RAIN) UNTIL PLANTS ARE ESTABLISHED.

BIOFILTRATION DEVICES NOTES

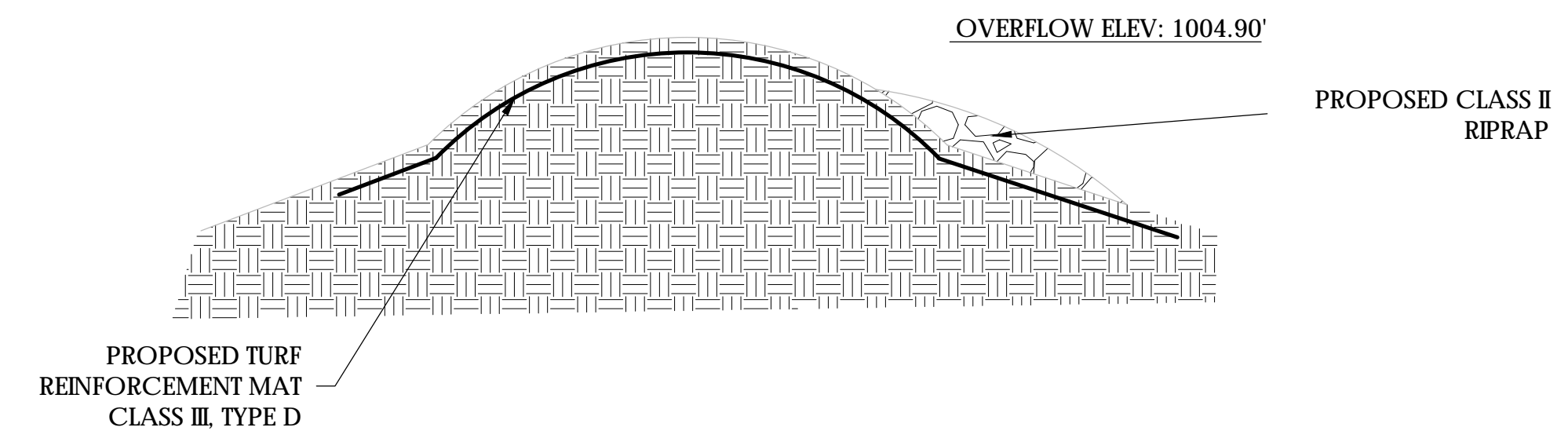


SECTION A-A

PROPOSED POND CROSS SECTION



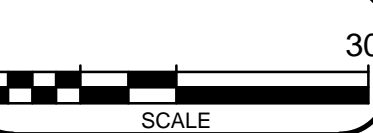
OVERFLOW WEIR



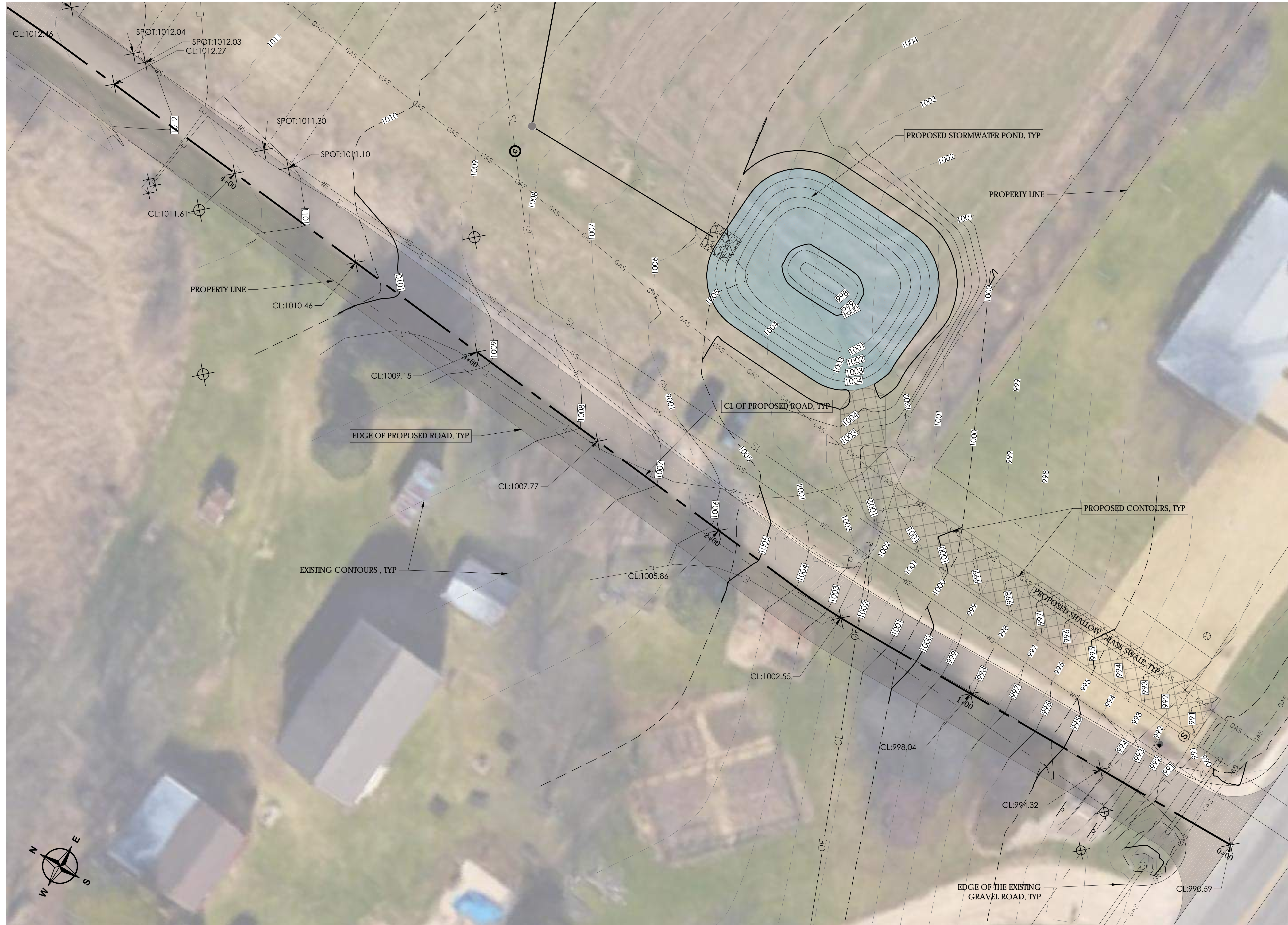
OVERFLOW WEIR CROSS SECTION

WEIR DETAIL

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REVIEWED BY	KDA
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GEC FILE NO.	2-0116-72
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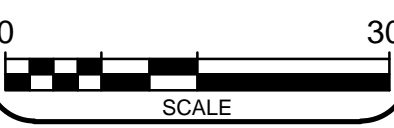
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SPOT ELEVATION SITE PLAN - ROAD
 Schumacher Farm Center for Rural Heritage

Town of Westport
 Dane County, WI

REVISIONS	NO.	BY	DATE
Bidding Documents	1	LAL	05/09/2017

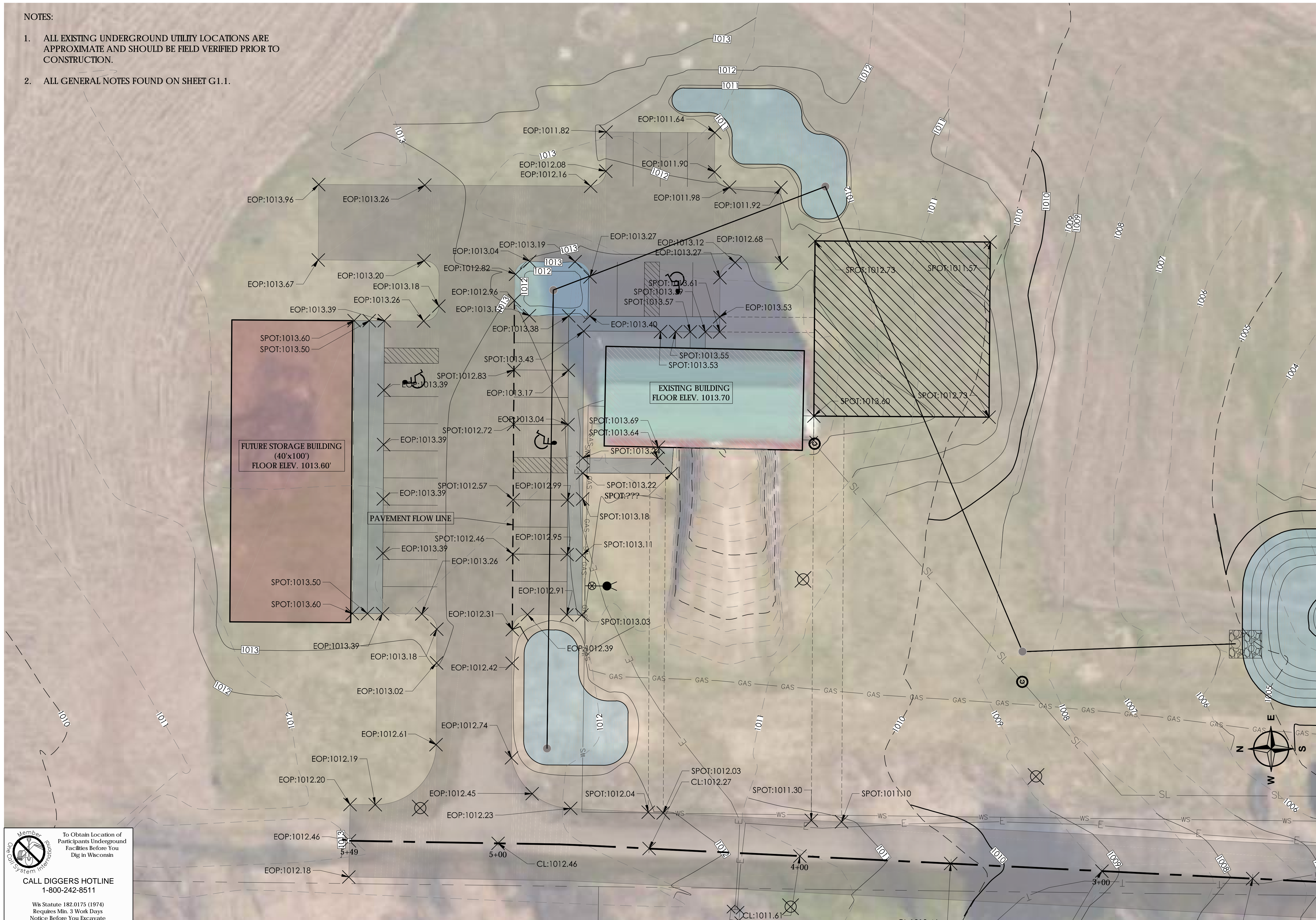


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SHEET NO.	

C5.0

NOTES:

1. ALL EXISTING UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
2. ALL GENERAL NOTES FOUND ON SHEET G1.1.



Member
Wisconsin
Utility System Interchange

To Obtain Location of Participants Underground Facilities Before You Dig in Wisconsin

CALL DIGGERS HOTLINE
1-800-242-8511

Wis Statute 182.0175 (1974)
Requires Min. 3 Work Days
Notice Before You Excavate



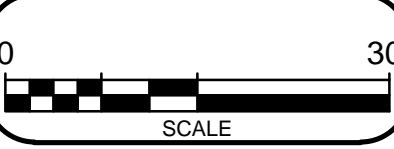
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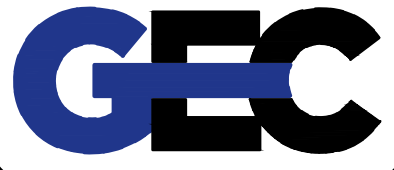
SPOT ELEVATION SITE PLAN-PROJECT
Schumacher Farm Center for Rural Heritage

Town of Westport
Dane County, WI

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MISC. CONSTRUCTION DETAILS
Schumacher Farm Center for Rural Heritage

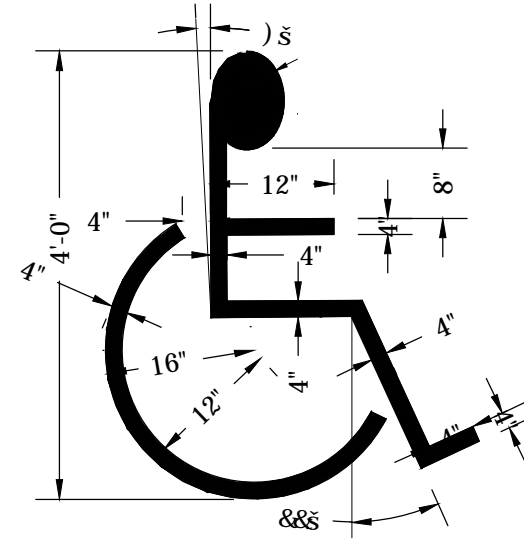
Town of Westport
Dane County, WI

REVISIONS	NO.	BY	DATE
Bidding Documents	1	LAL	05/09/2017



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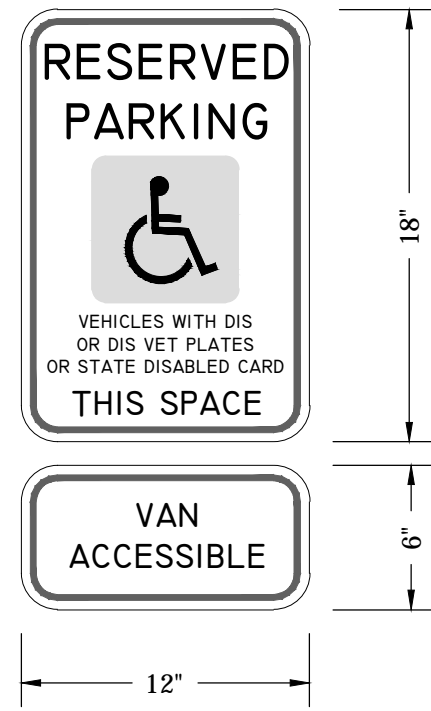
C6.0



PAINTED ADA SYMBOL

NOTES:

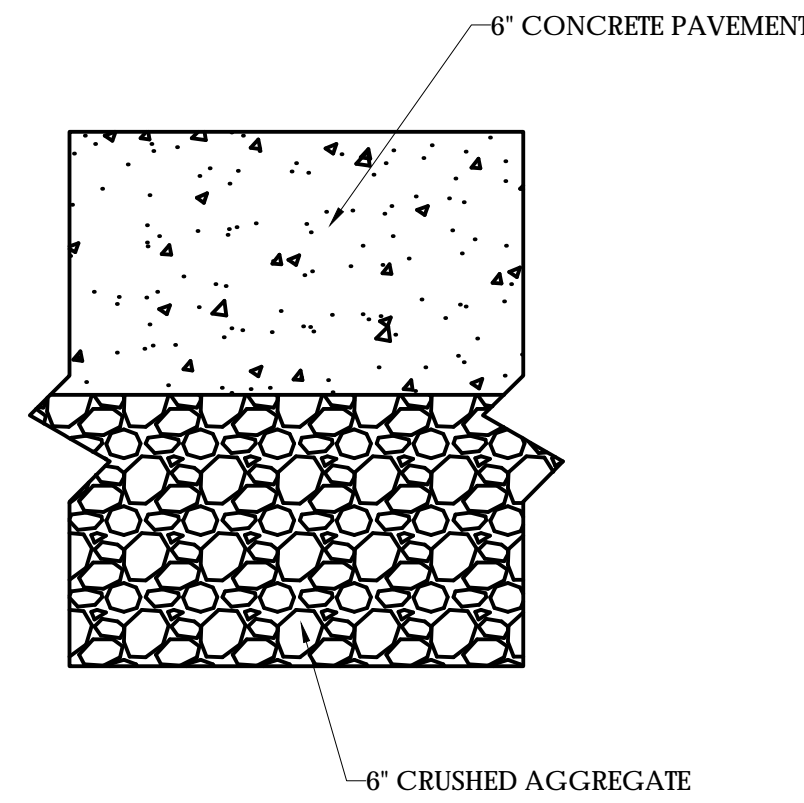
- SIGNAGE SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) SIGNAGE REGULATIONS.
- PAINTED SYMBOL TO BE @ ALL ACCESSIBLE SPACES.



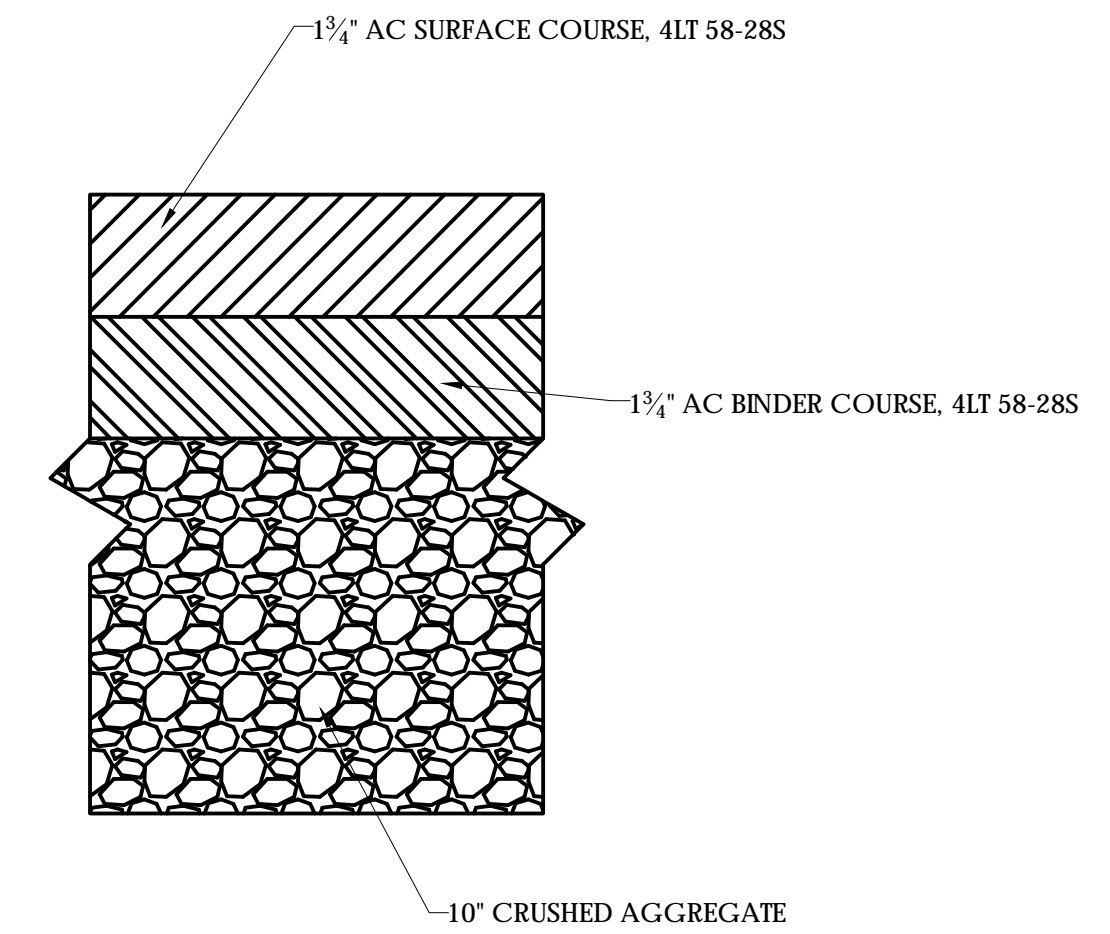
ADA ACCESSIBLE SIGN

NOTES:

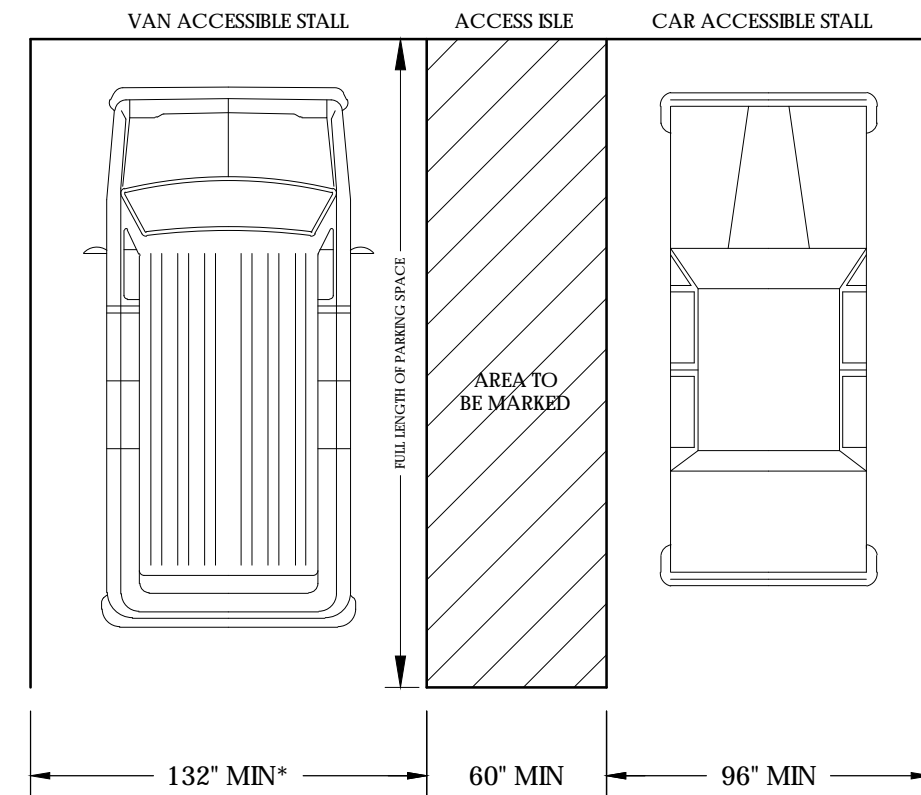
- ONE SIGN REQUIRED FOR EACH PARKING SPACE.
- SIGN SHALL BE 60" MIN ABOVE THE GROUND SURFACE OF THE PARKING SPACE, MEASURED TO THE BOTTOM OF THE SIGN.
- SIGN SHALL CONSIST OF A WHITE RECTANGLE WITH LONGER DIMENSION VERTICAL, HAVING GREEN MESSAGE AND A BLUE & WHITE INTERNATIONAL SYMBOL FOR THE BARRIER-FREE ENVIRONMENTS.
- THE SIGN MAY BE REFLECTIVE OR NON-REFLECTIVE.



CONCRETE SIDEWALK SECTION



ASPHALTIC PAVEMENT SECTION



ADA VEHICLE PARKING SPACE SIZE
*96" MIN WHERE ADJACENT AISLE IS 96" MIN

TOTAL PARKING SPACES PROVIDED	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES*
1 TO 25	1
26 TO 50	2
51 TO 75	3
76 TO 100	4
101 TO 150	5
151 TO 200	6
201 TO 300	7
301 TO 400	8
401 TO 500	9
501 TO 1000	25% OF TOTAL
1000 & OVER	20 PLUS 1 FOR EACH 100, OR FRACTION THEREOF, OVER 1000

*1 IN 8 ACCESSIBLE PARKING STALLS MUST BE VAN ACCESSIBLE. A MINIMUM OF 1 VAN ACCESSIBLE STALL IS REQUIRED IN ALL PARKING LOTS

TYPICAL ADA DETAIL

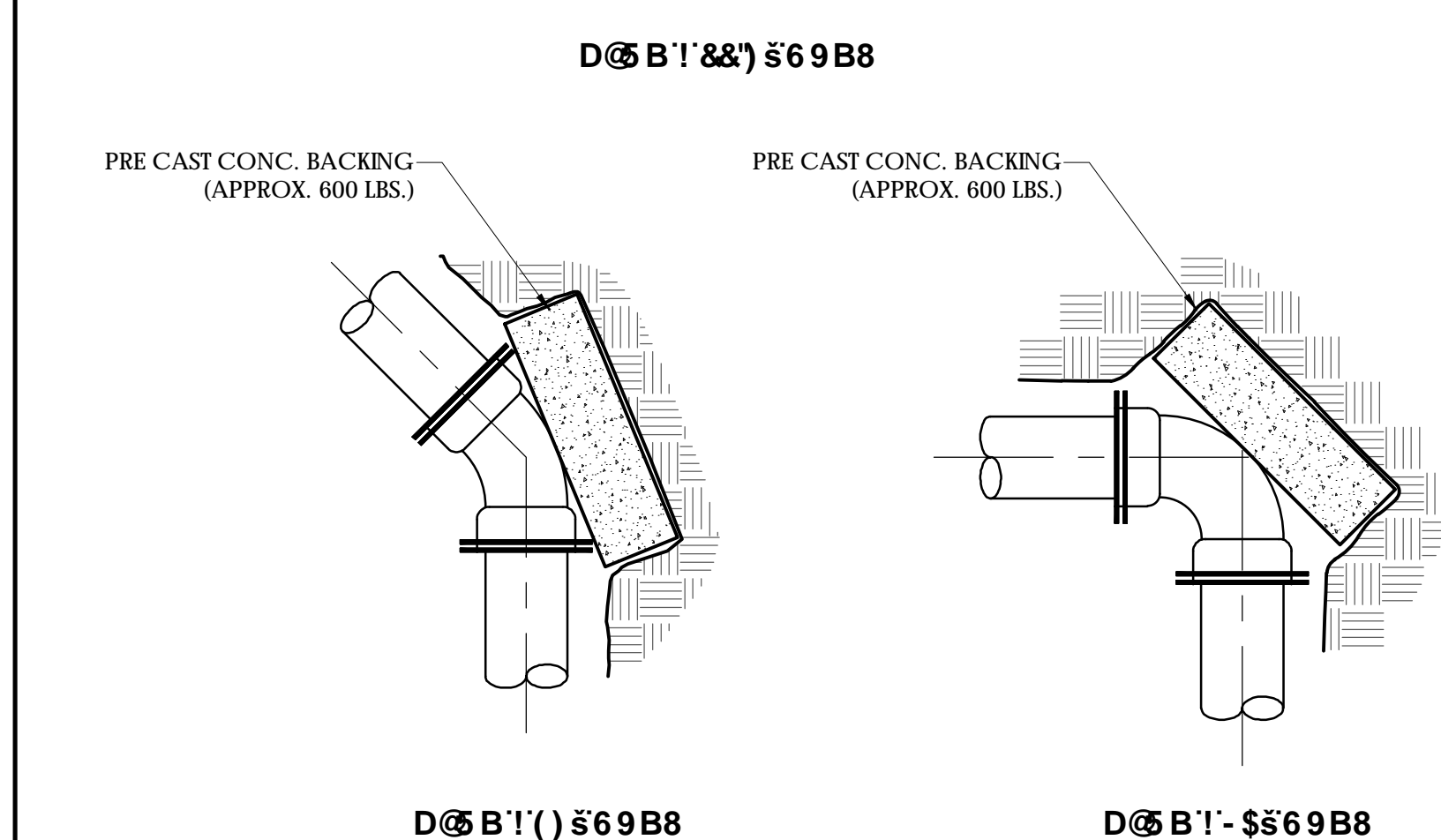
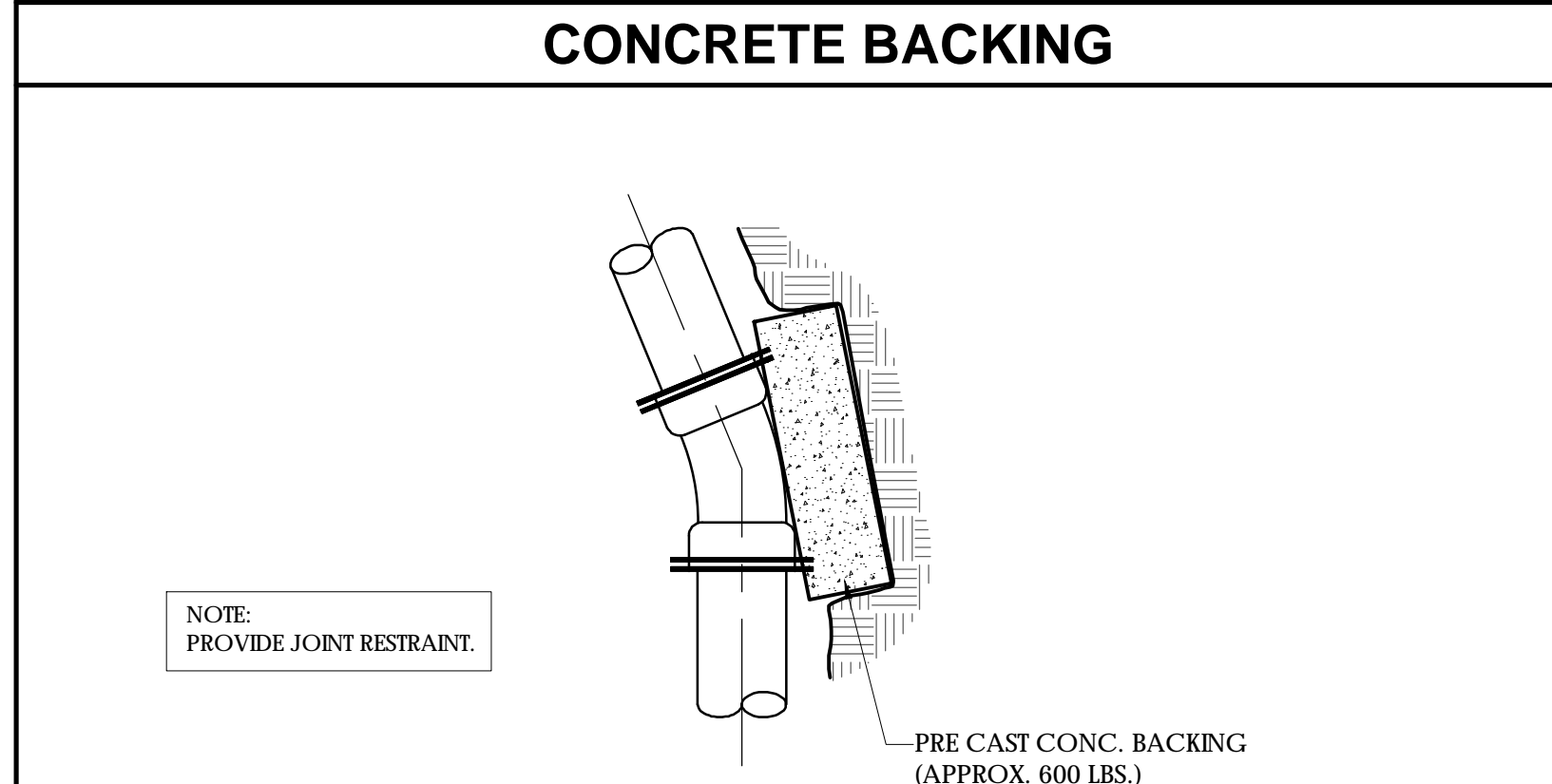
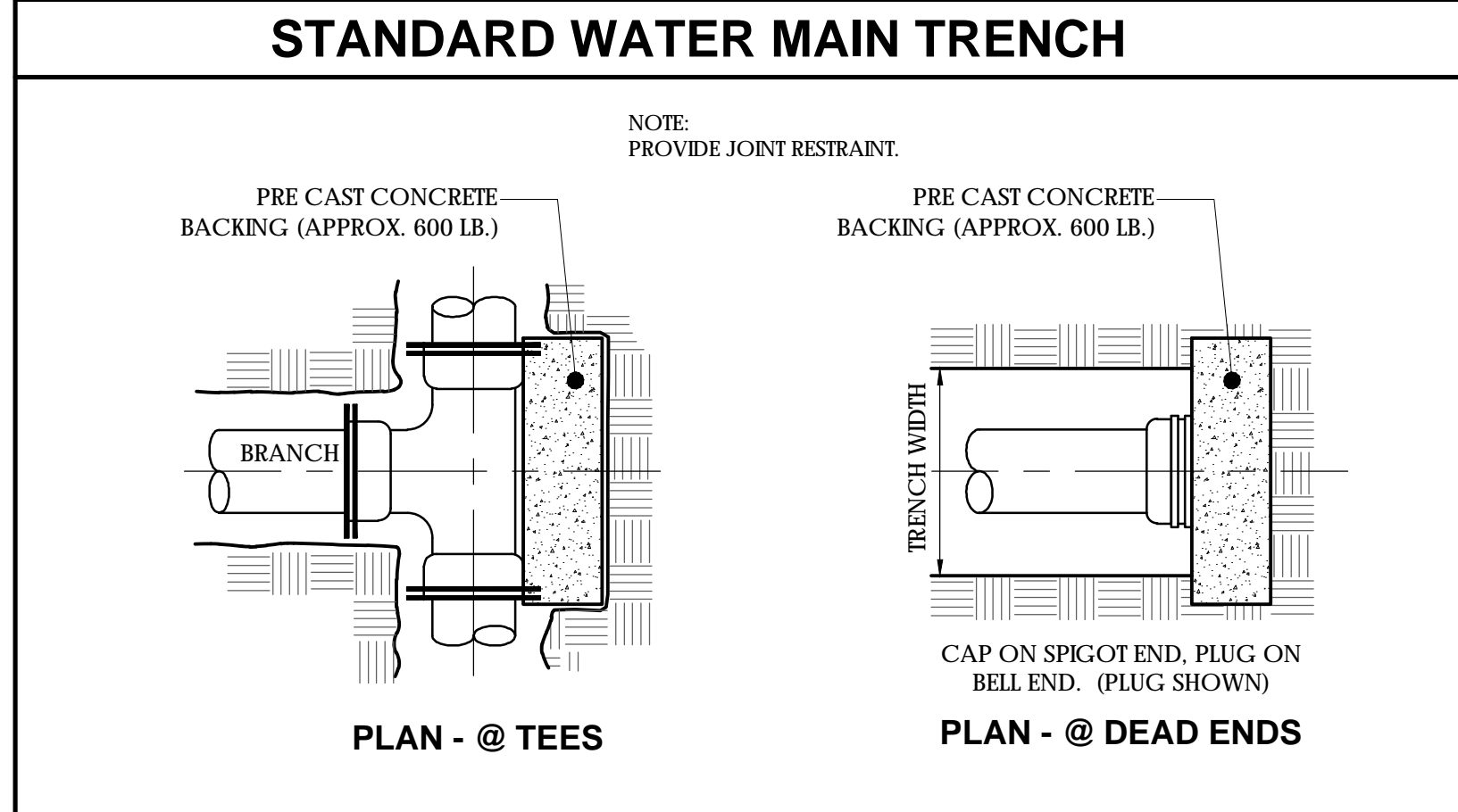
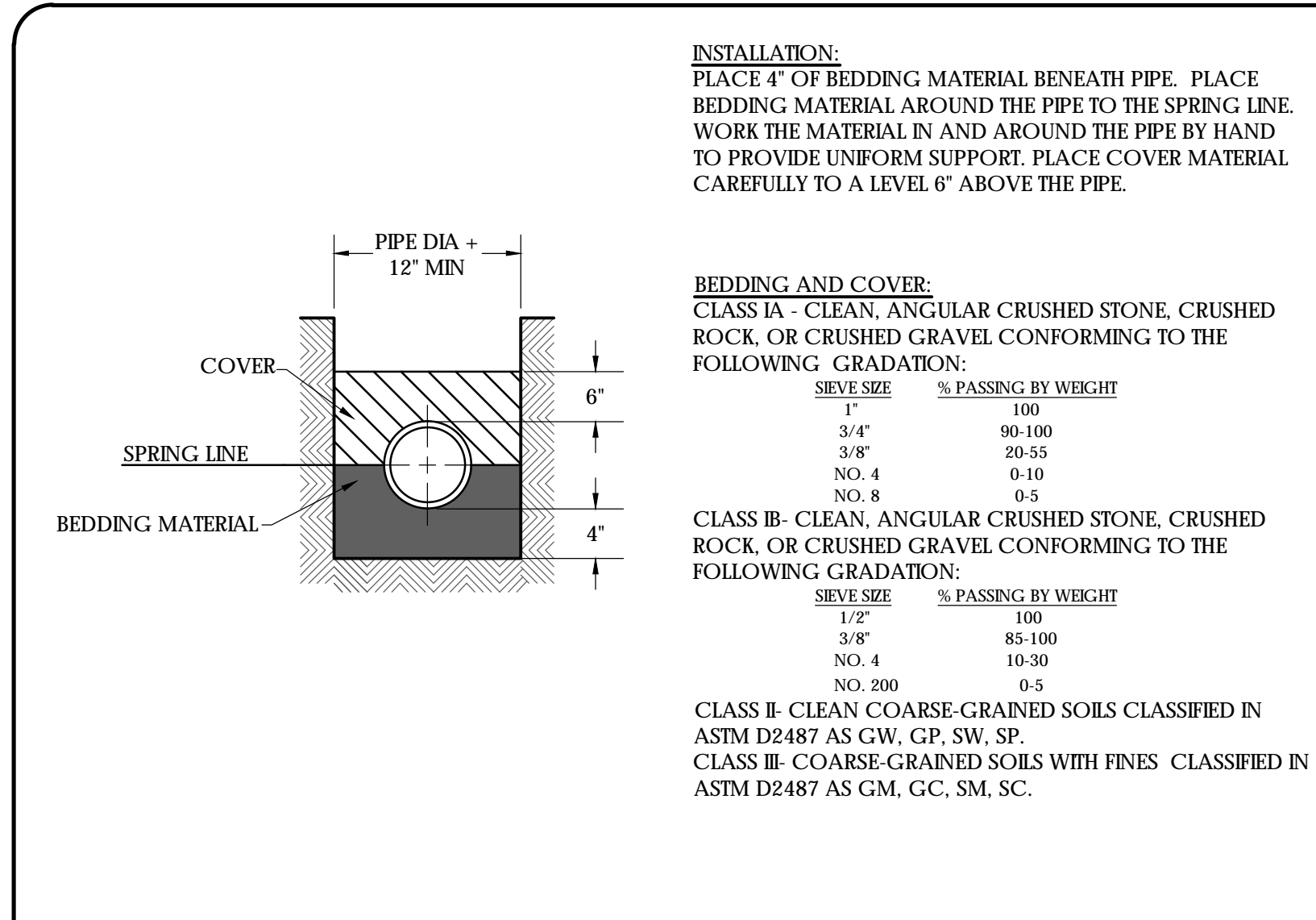
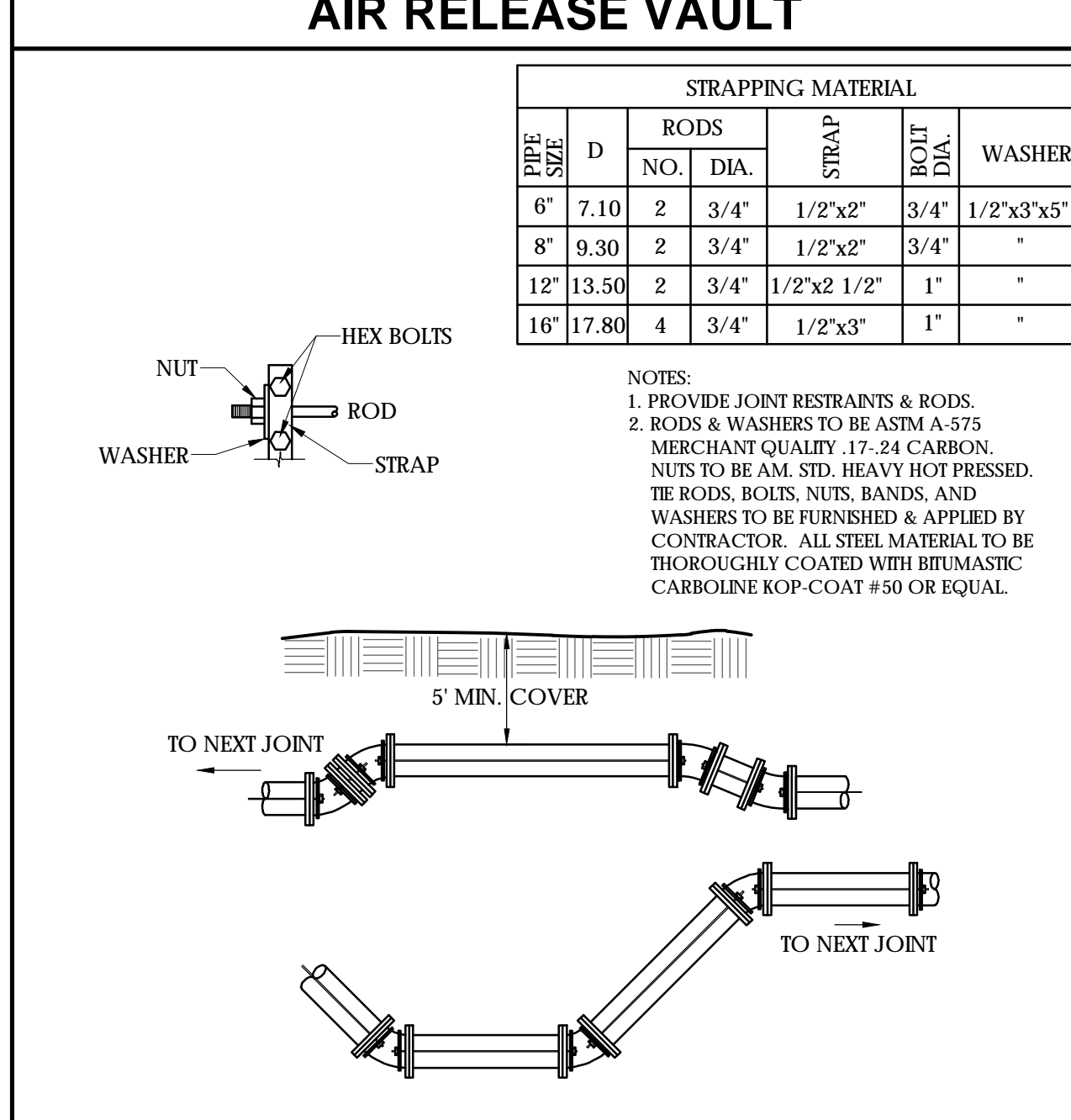
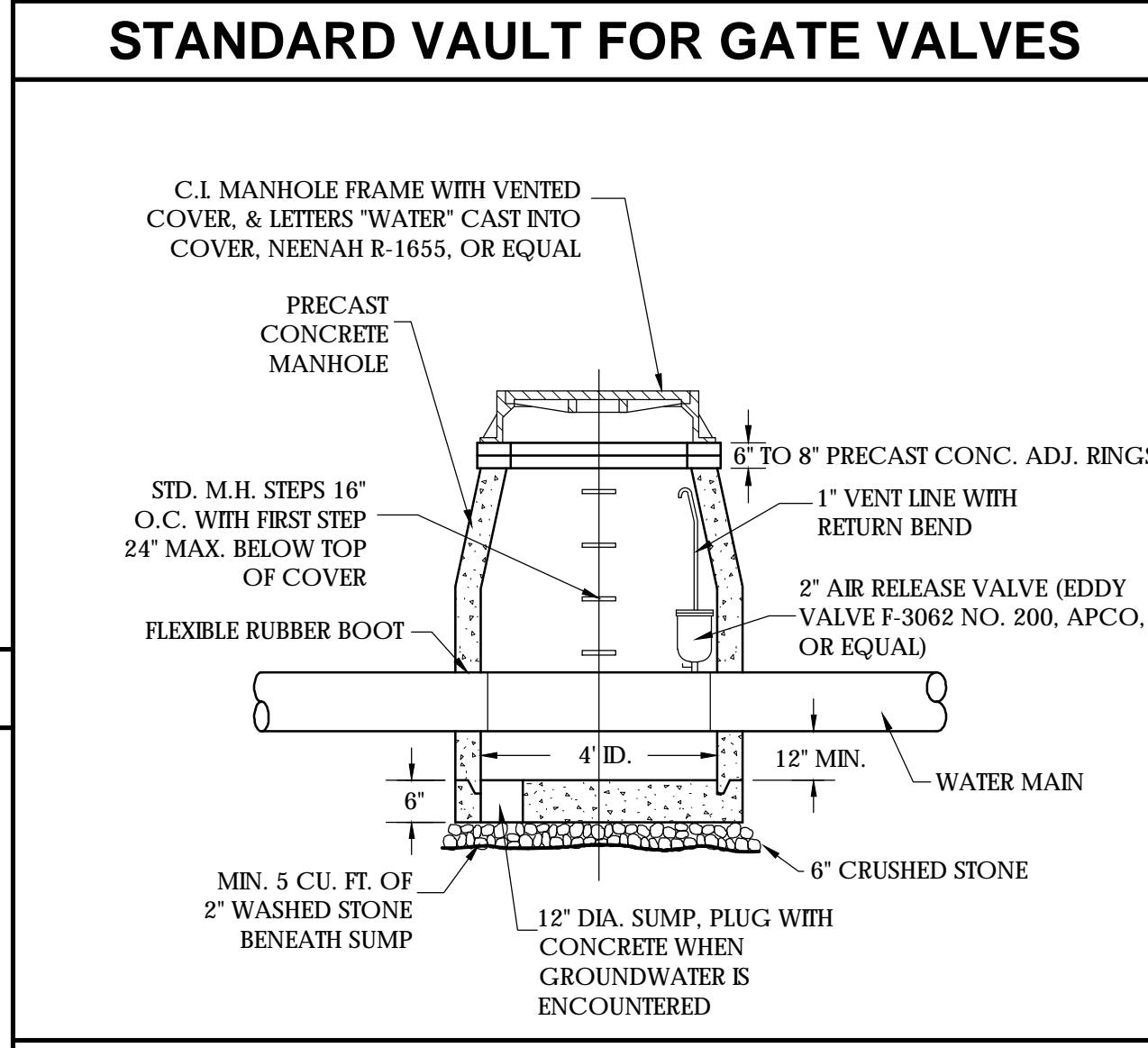
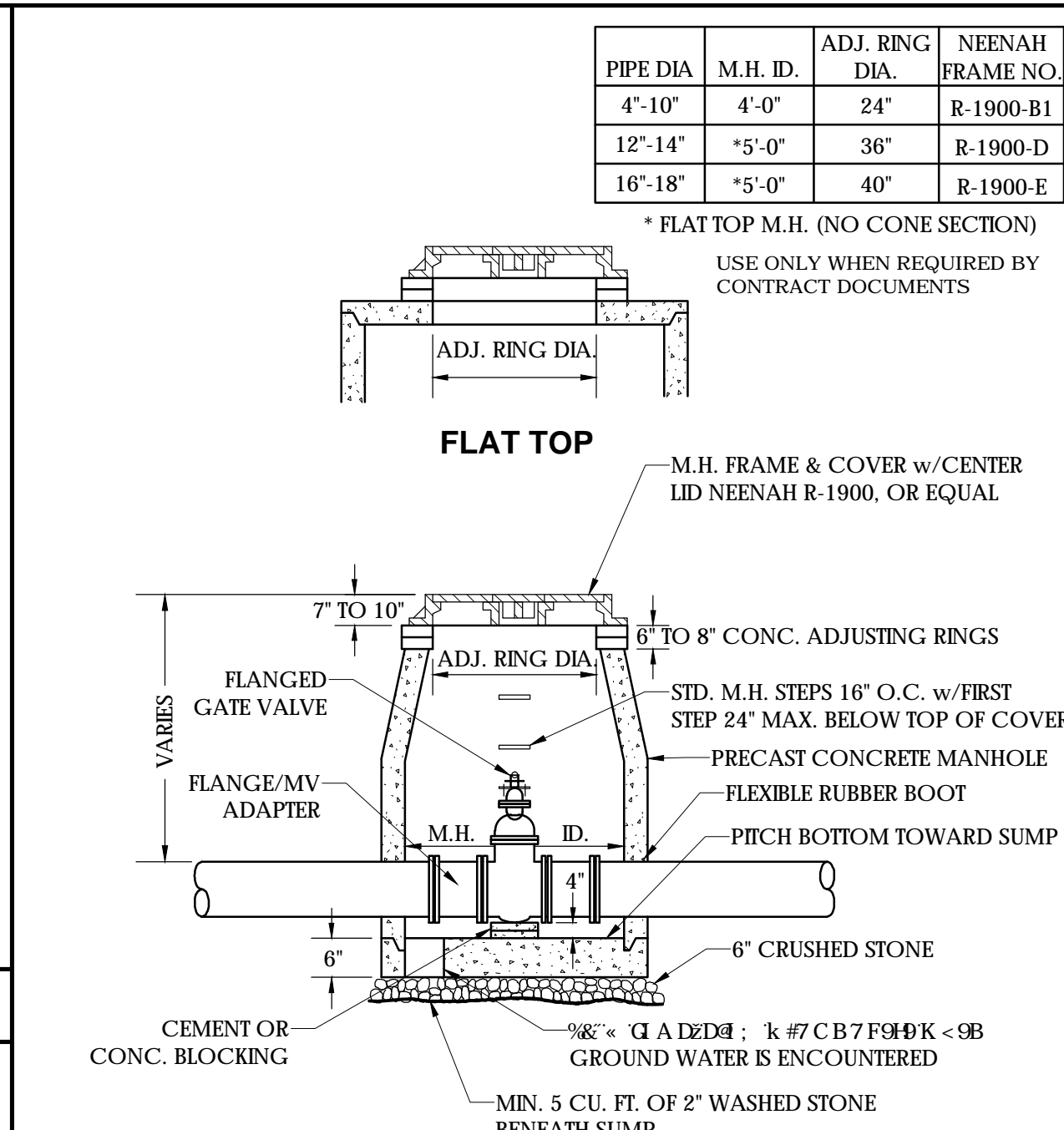
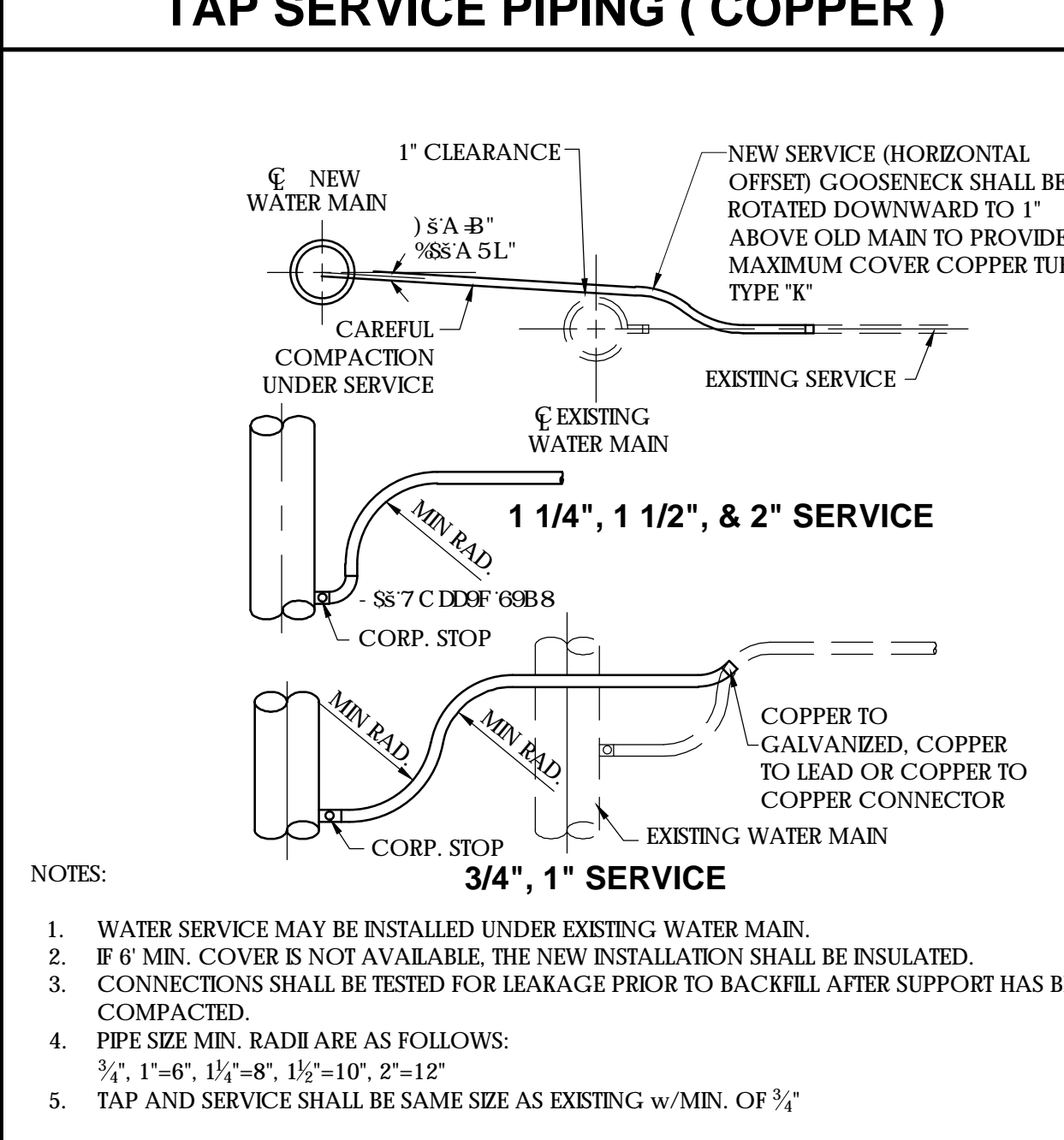
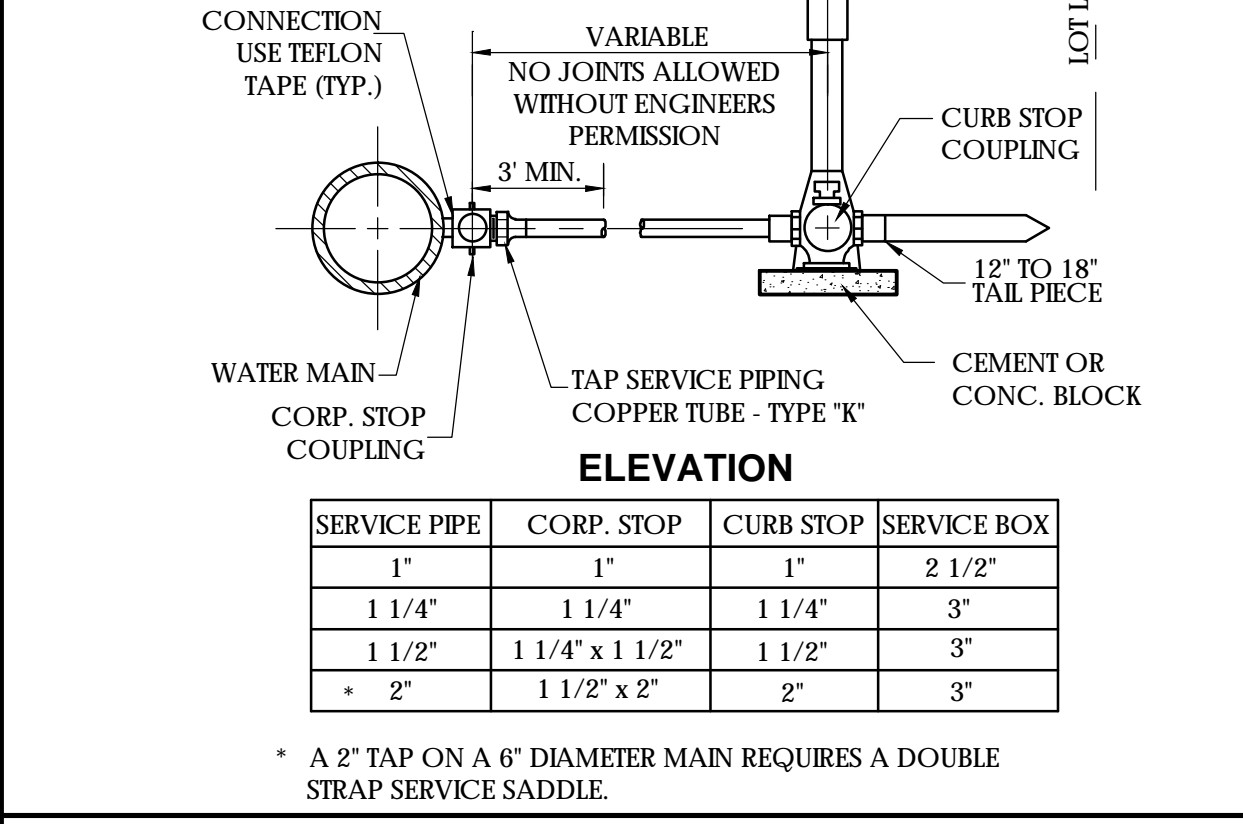
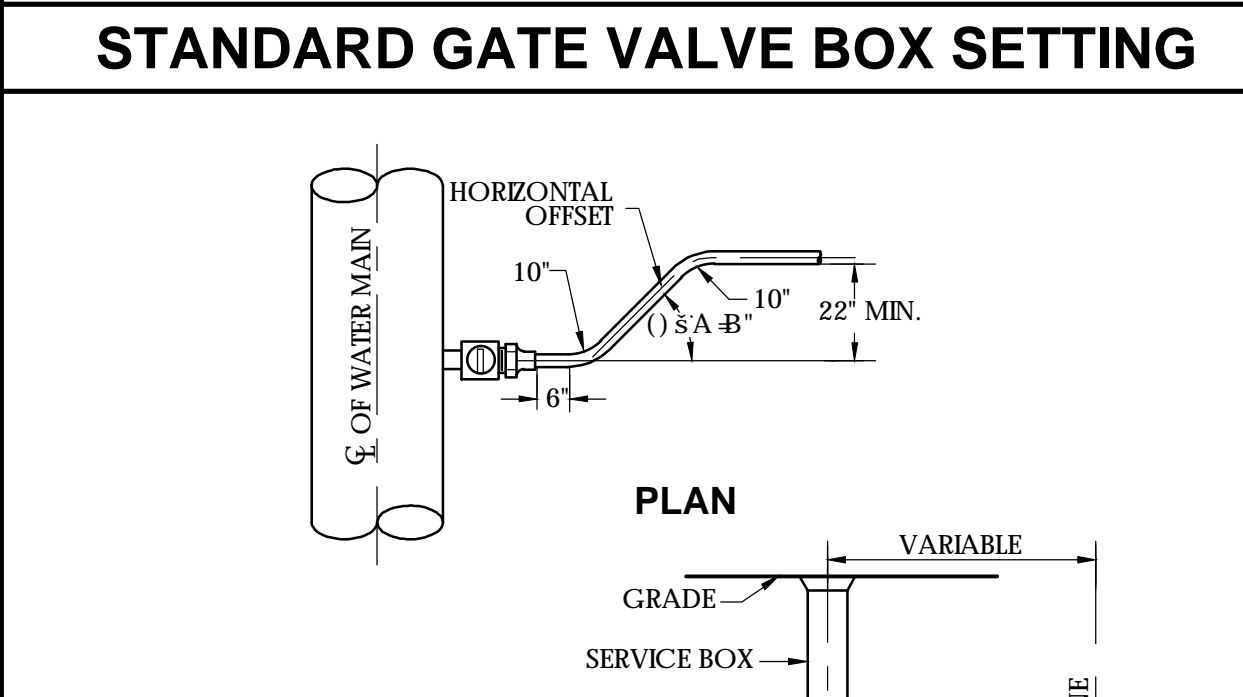
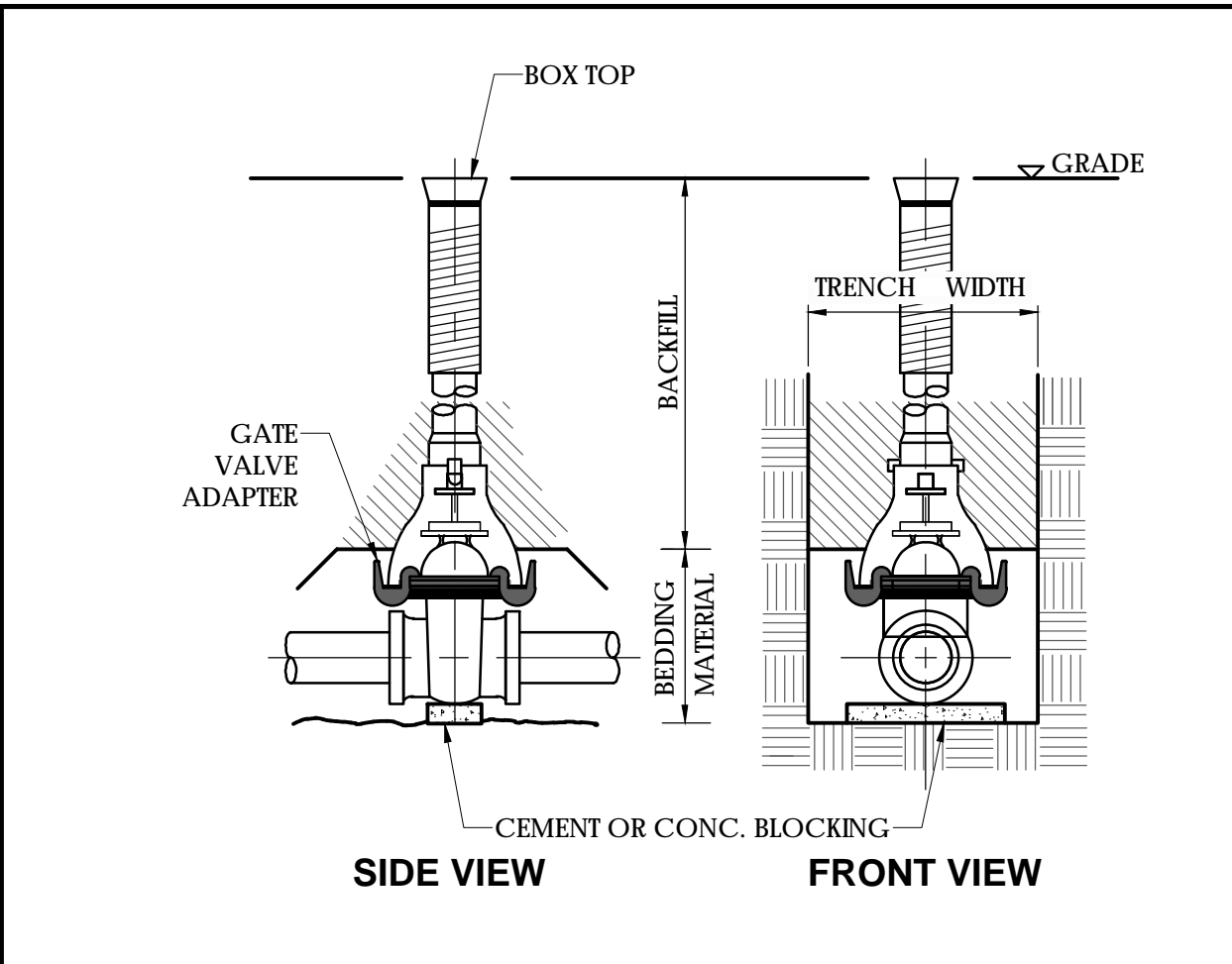
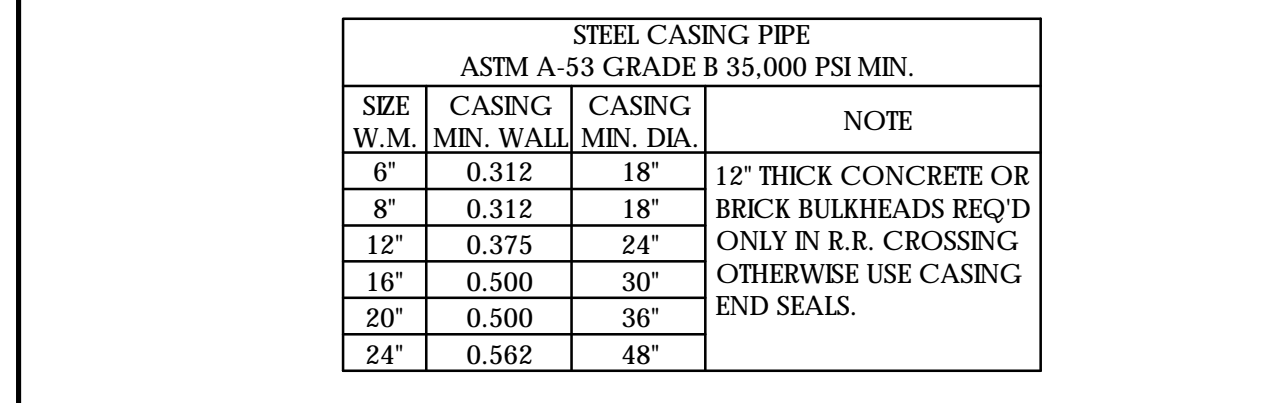
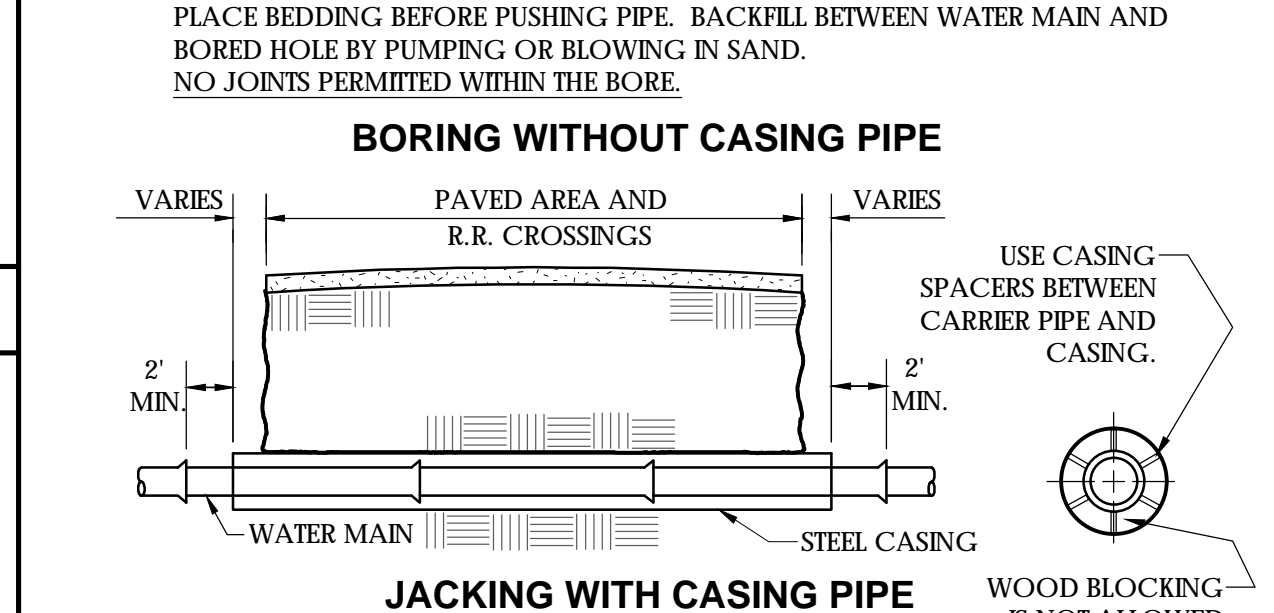
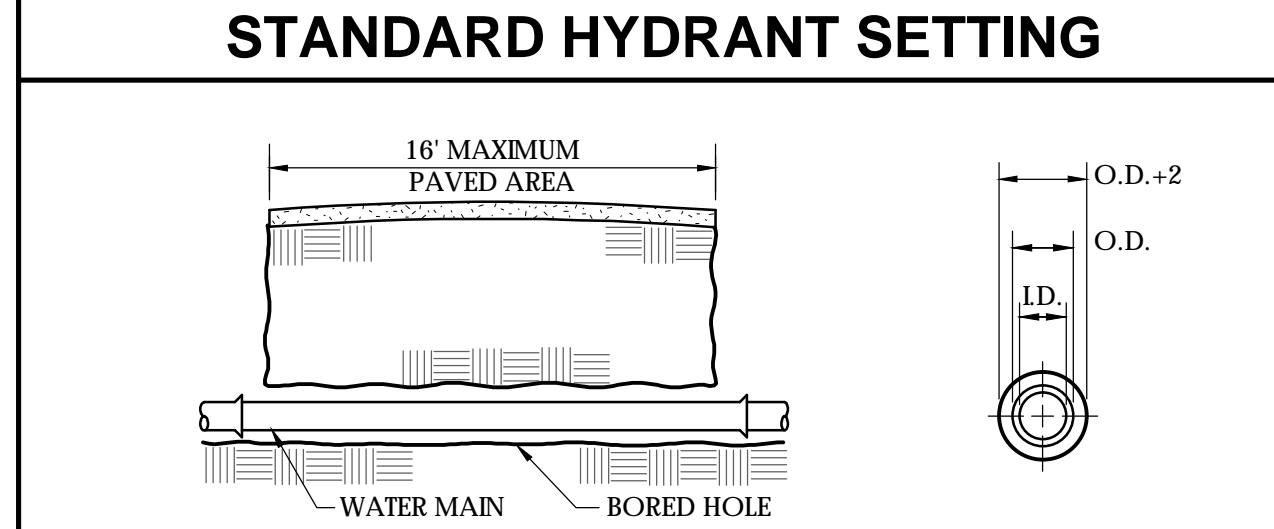
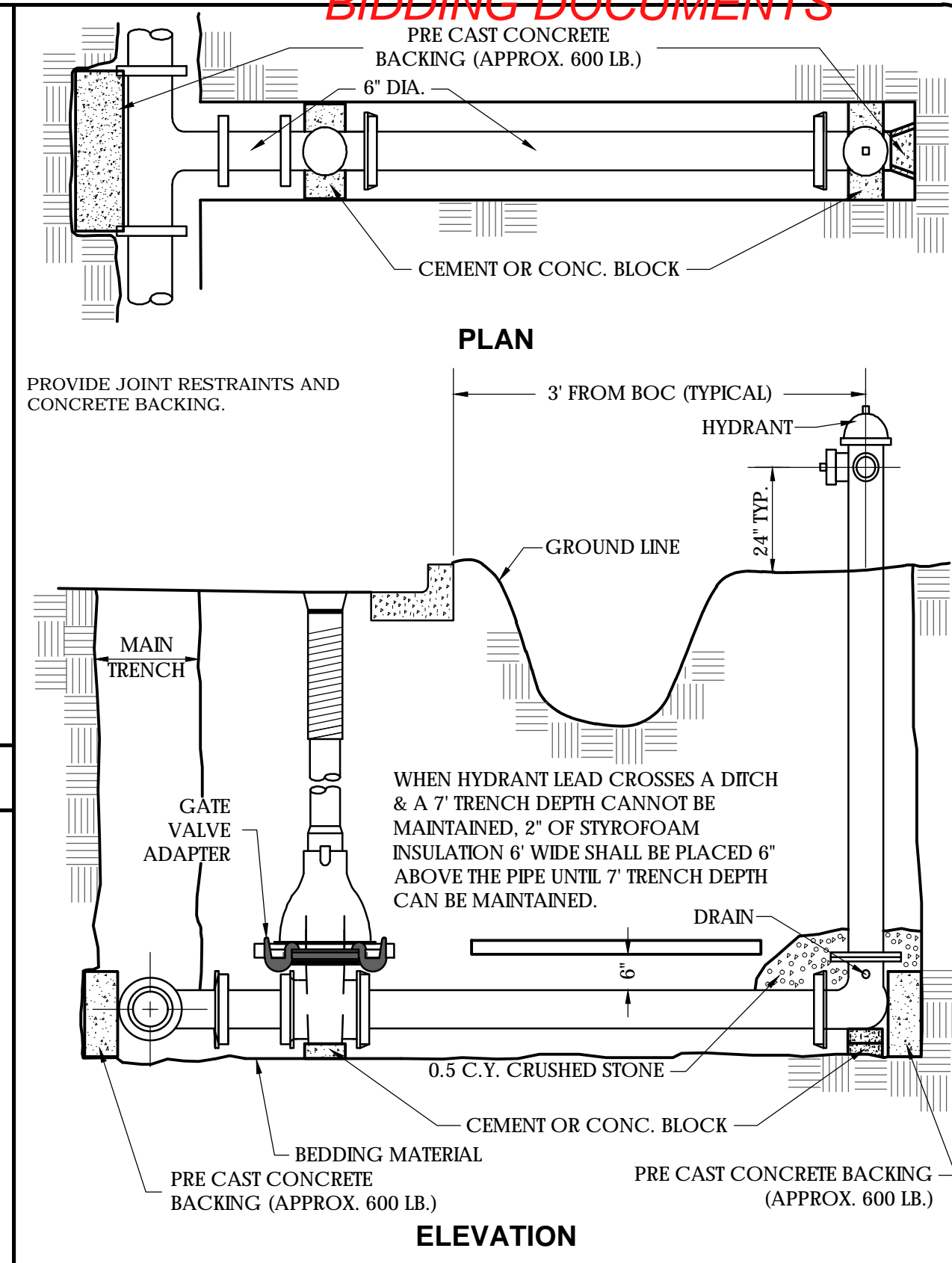


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WATER MAIN CONSTRUCTION DETAILS
 Schumacher Farm Center for Rural Heritage
 Town of Westport
 Dane County, WI

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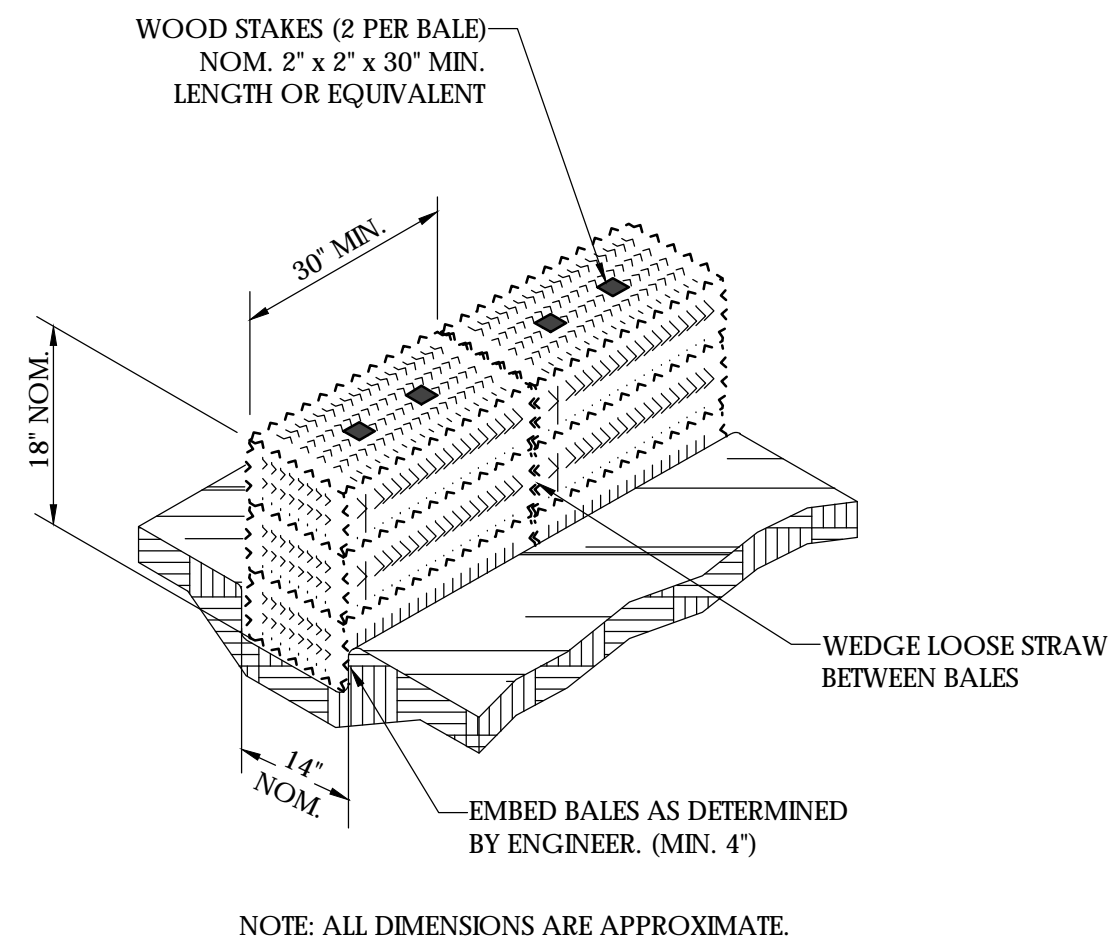
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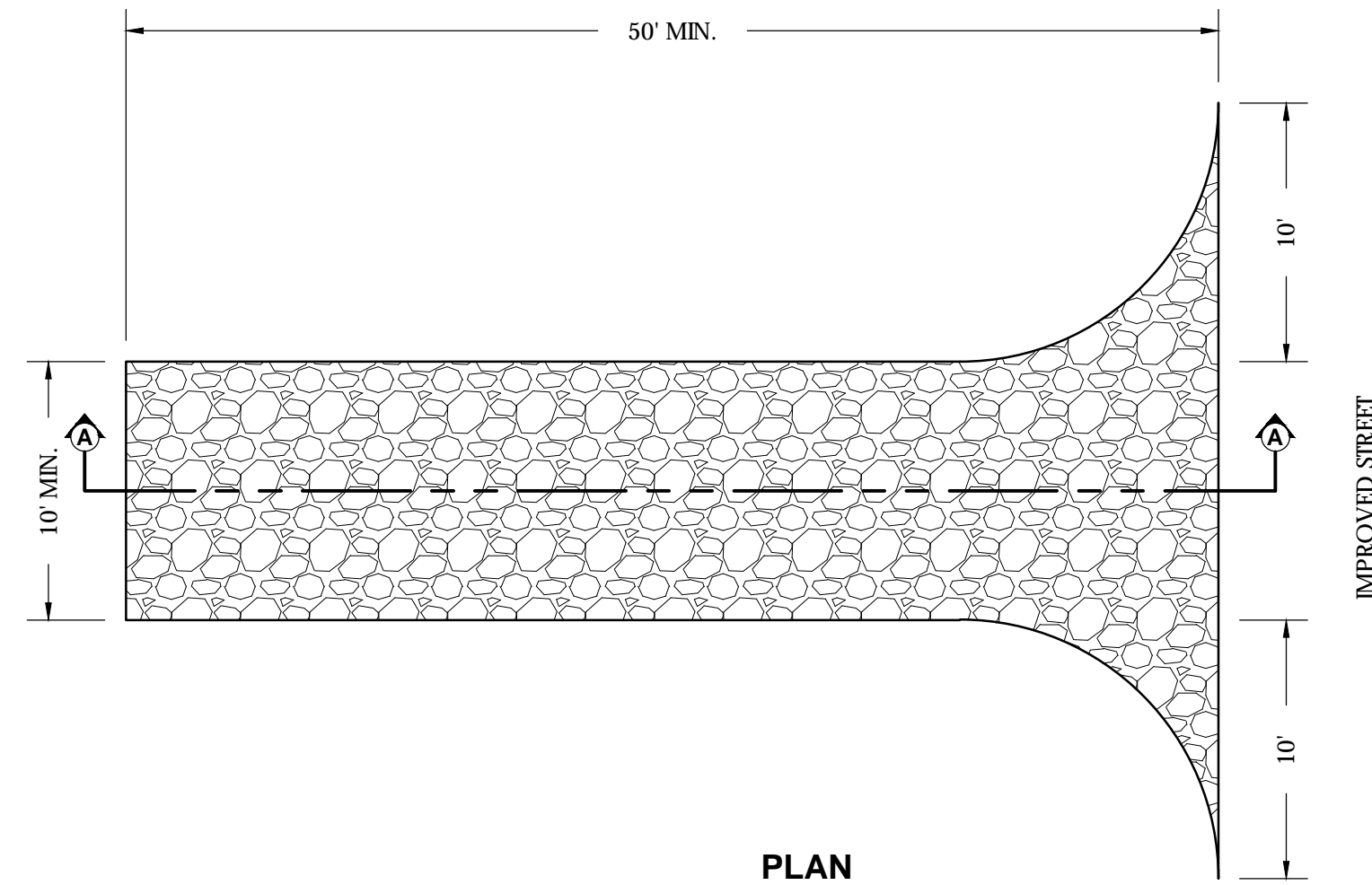
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EROSION CONTROL DETAILS
Schumacher Farm Center for Rural Heritage

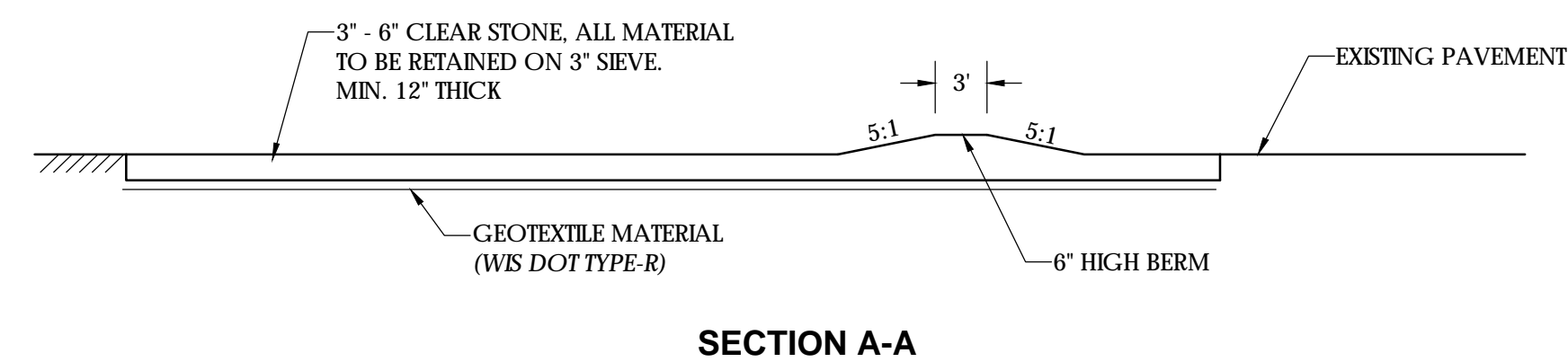
Town of Westport
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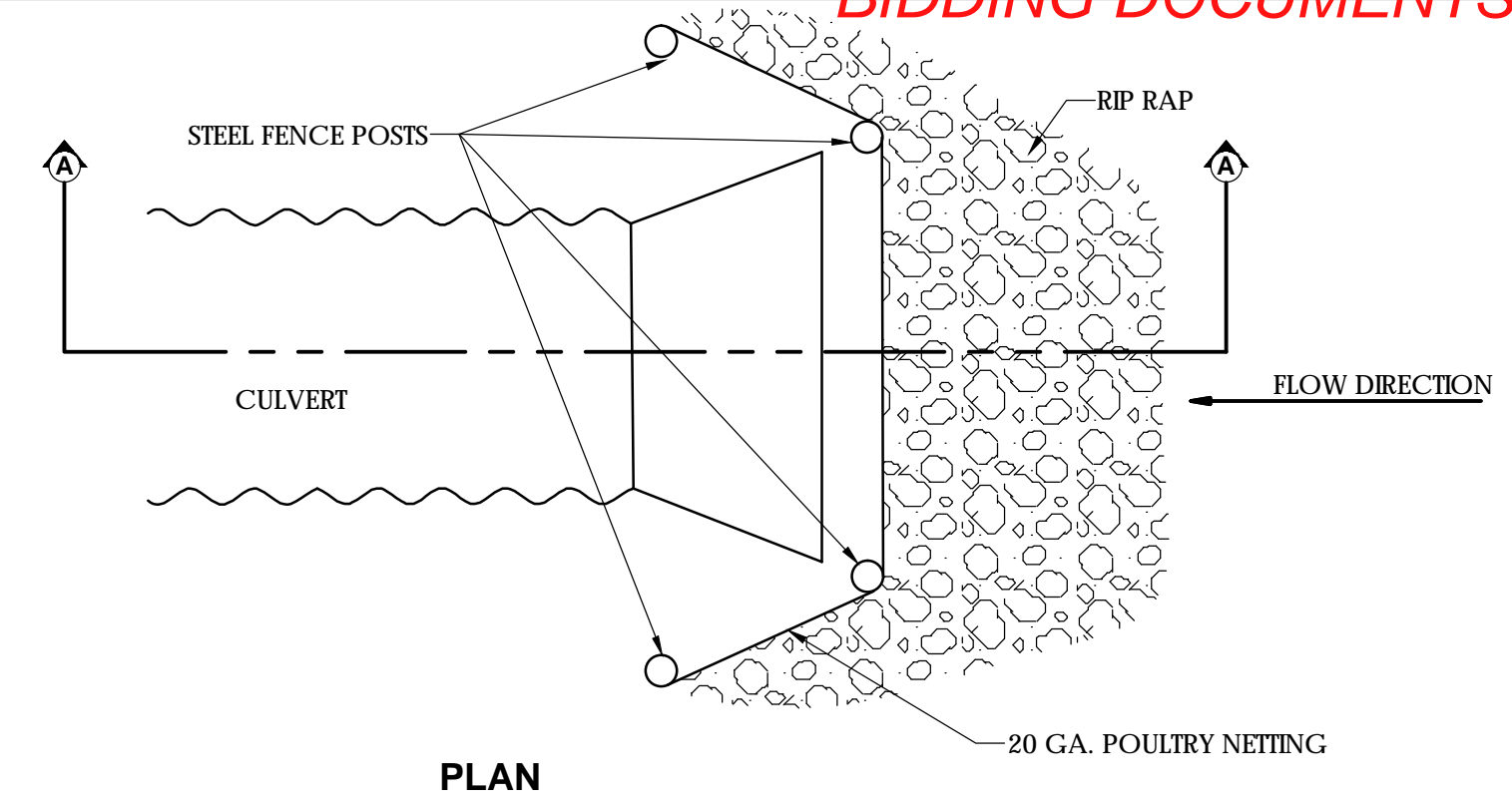
EROSION BALE INSTALLATION



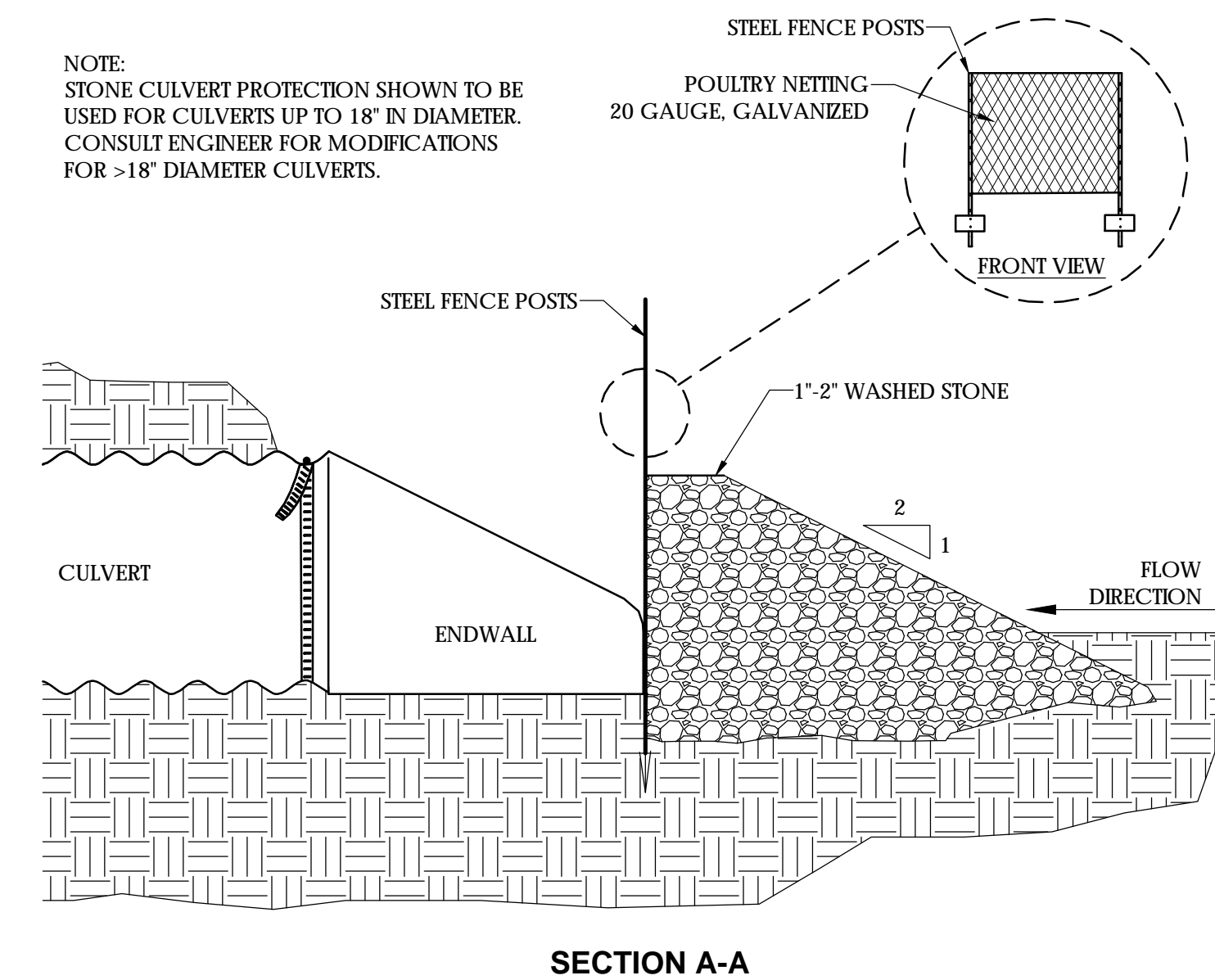
NOTE:
MAINTAIN THE ROCK ENTRANCE TO PREVENT TRACKING ONTO PAVEMENT



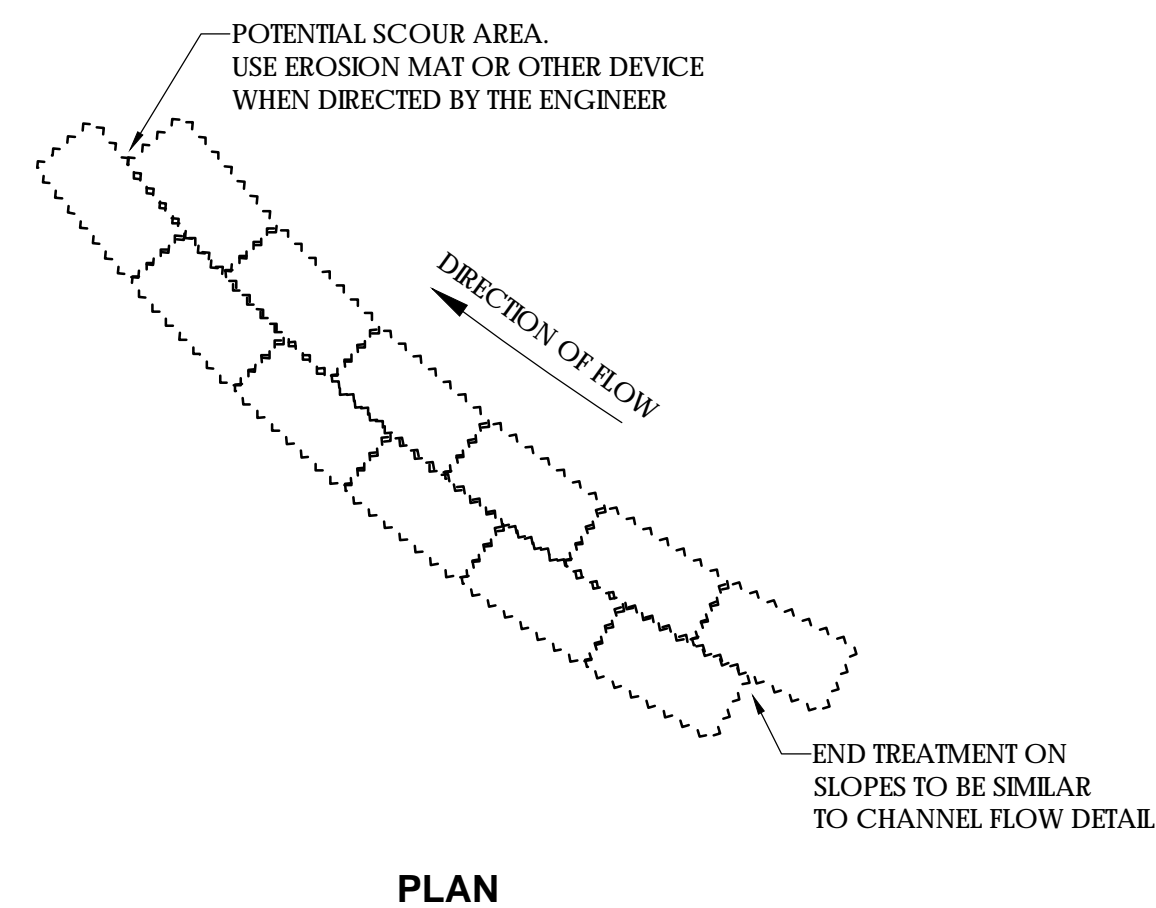
ROCK CONSTRUCTION ENTRANCE



NOTE:
STONE CULVERT PROTECTION SHOWN TO BE USED FOR CULVERTS UP TO 18" IN DIAMETER. CONSULT ENGINEER FOR MODIFICATIONS FOR >18" DIAMETER CULVERTS.



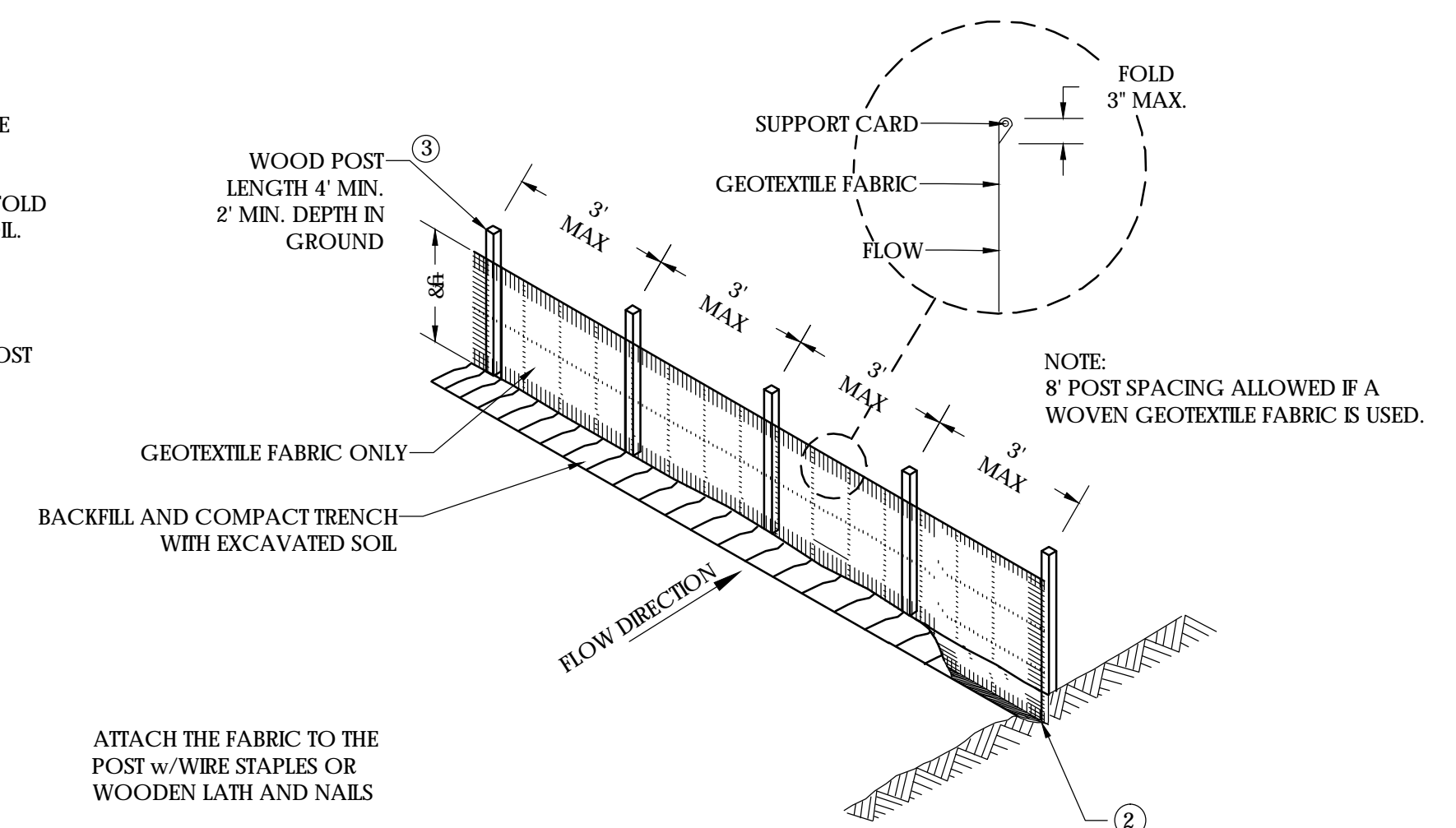
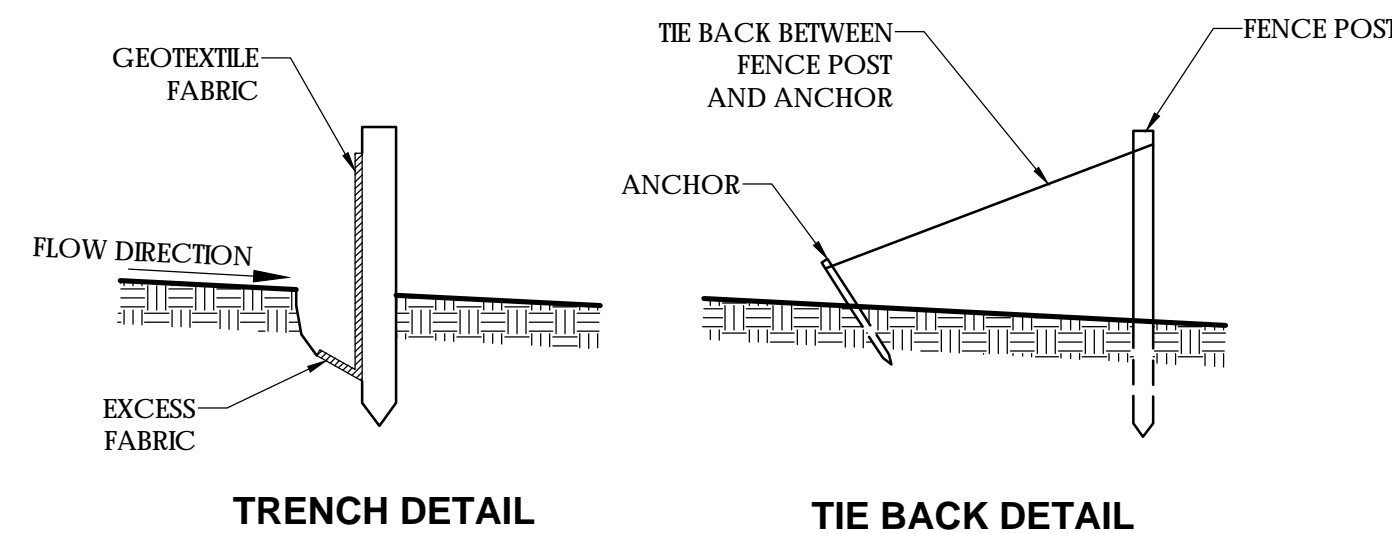
STONE CULVERT PROTECTION



EROSION BALE WHEN ALTERING FLOW DIRECTION

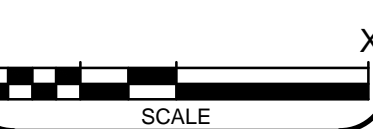
NOTES:

- ① HORIZONTAL BRACE WITH 2" X 4" WOODEN FRAME OR EQUIVALENT AT TOP OF POST AS DIRECTED BY THE ENGINEER.
- ② TRENCH SHALL BE A MINIMUM OF 4" WIDE BY 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC, FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH AND COMPACT WITH EXCAVATED SOIL.
- ③ WOOD POST SHALL BE A MINIMUM SIZE OF 1 1/8" X 1 1/8" OF OAK OR HICKORY.



SILT FENCE

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CONSTRUCTION SITE EROSION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. FURNISHING, INSTALLING, MAINTAINING, AND REMOVING EROSION AND SEDIMENT CONTROL FACILITIES AND MEASURES.
- B. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL EROSION CONTROL FACILITIES AND MEASURES NECESSARY TO CONTROL EROSION AND SEDIMENTATION AT THE WORK SITE. THESE FACILITIES AND MEASURES MAY OR MAY NOT BE SHOWN ON THE DRAWINGS AND THEIR ABSENCE ON THE DRAWINGS DOES NOT ALLEVIATE THE CONTRACTOR FROM PROVIDING THEM. ANY MEASURES AND FACILITIES SHOWN ON THE DRAWINGS ARE THE MINIMUM ACTIONS REQUIRED.

1.02 REFERENCES

- A. WDNR TECHNICAL STANDARDS - SEE DNR WEBSITE @ <http://dnr.state.wi.us/org/water/wm/nps/stormwater/techstds.htm>
- B. WISCONSIN DEPARTMENT OF TRANSPORTATION, EROSION CONTROL, PRODUCT ACCEPTABILITY LISTS FOR MULTI-MODAL APPLICATIONS PAL, CURRENT EDITION.

1.03 GENERAL

- A. REQUIREMENTS OF WDNR TECHNICAL STANDARDS SHALL BE FOLLOWED AT ALL TIMES.
- B. USE SURFACE WATER AND EROSION CONTROL FACILITIES AND MEASURES THROUGHOUT THE DURATION OF THE CONSTRUCTION ACTIVITY TO CONTROL THE MOVEMENT OF SURFACE WATER AND TO REDUCE THE POTENTIAL FOR EROSION. MAINTAIN THE FACILITIES AND MEASURES UNTIL PERMANENT VEGETATION IS ESTABLISHED.
- C. ERODED SOIL MATERIAL SHALL NOT BE ALLOWED TO LEAVE THE CONSTRUCTION SITE OR TO ENTER A WATERWAY, LAKE, OR WETLAND.
- D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, INSTALLING, AND MAINTAINING THE EROSION CONTROL FACILITIES, AND IN GENERAL, SHALL USE CONSTRUCTION PRACTICES THAT MINIMIZE EROSION.
- E. ERODED MATERIAL THAT HAS LEFT THE CONSTRUCTION SITE SHALL BE COLLECTED AND RETURNED TO THE SITE BY THE CONTRACTOR.
- F. PREVENT CONSTRUCTION SITE TRACKING WITH GRAVELED ROADS, ACCESS DRIVES, AND PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH TO PREVENT SEDIMENT FROM BEING TRACKED ONTO PUBLIC AND PRIVATE ROADWAYS. ANY SEDIMENT REACHING A PUBLIC OR PRIVATE ROAD SHALL BE REMOVED BY STREET CLEANING (NOT FLUSHING) BEFORE THE END OF EACH WORKDAY.

1.04 SEQUENCING AND SCHEDULING

- A. CONSTRUCT AND STABILIZE EROSION CONTROL MEASURES FOR DIVERSIONS OR OUTLETS PRIOR TO ANY GRADING OR DISTURBANCE OF THE CONSTRUCTION SITE.
- B. INSTALL FILTER FABRIC AND STRAW BALE FENCES AND BARRIERS PRIOR TO DISTURBING THE AREA.
- C. TURF AREAS THAT HAVE BEEN COMPLETED TO FINISH GRADE SHALL BE STABILIZED WITH PERMANENT SEEDING WITHIN SEVEN DAYS. TURF AREAS WHERE ACTIVITY HAS CEASED AND THAT WILL REMAIN EXPOSED FOR MORE THAN 20 DAYS BEFORE ACTIVITY RESUMES AND SOIL STOCKPILES SHALL BE STABILIZED WITH TEMPORARY SEEDING OR SOIL STABILIZER.
- D. OTHER EROSION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO DISTURBANCE OF THE CONSTRUCTION SITE, AS APPLICABLE.

PART 2 - PRODUCTS

2.01 SILT FENCE

- FABRIC SHALL BE SHALL A WOVEN OR NONWOVEN POLYESTER, POLYPROPYLENE, STABILIZED NYLON, OR POLYETHYLENE GEOTEXTILE WITH THE FOLLOWING MINIMUM PROPERTIES:

PROPERTY	TEST METHOD	REQUIREMENT*
GRAB TENSILE STRENGTH, LBS MIN. MACHINE DIRECTION	ASTM D 4632	120
CROSS DIRECTION		100
MAX. APPARENT OPENING SIZE, US SIEVE	ASTM D 4751	NO. 30
PERMITTIVITY, SEC-1, MIN.	ASTM D 4491	0.05
MIN. UV STABILITY AT 500 HRS. %	ASTM D 4355	70%

* MINIMUM OR MAXIMUM AVERAGE ROLL VALUES.

2.02 STRAW BALES

- A. STRAW OR HAY BALES IN GOOD CONDITON WITH NOMINAL DIMENSIONS OF 14" W X 18" H X 30".
- B. STAKES: WOOD STAKES WITH MINIMUM NOMINAL DIMENSIONS OF 2" X 2" X 30".

2.03 SEDIMENT LOGS

- A. WOOD EXCELSIOR LOG WRAPPED IN BIODEGRADABLE FABRIC OR MESH AND LISTED IN THE EROSION CONTROL PRODUCT ACCEPTABILITY LISTS.
- B. STAKES: WOOD STAKES WITH MINIMUM NOMINAL DIMENSION OF 1" X 1" X 24".

2.04 TEMPORARY SEED

- A. AREAS NEEDING PROTECTION DURING PERIODS WHEN PERMANENT SEEDING IS NOT APPLIED SHALL BE SEEDED WITH ANNUAL SPECIES FOR TEMPORARY PROTECTION. PROVIDE SPECIES AS FOLLOWS:

SPECIES	% PURITY
OATS	98
CEREAL RYE	97
WINTER WHEAT	95
ANNUAL RYEGRASS	97

- B. PROVIDE OATS FOR SPRING AND SUMMER. PROVIDE CEREAL RYE, WINTER WHEAT, OR ANNUAL RYEGRASS FOR FALL SEEDING.

2.05 EROSION MAT

- A. ALL EROSION MAT PRODUCTS SHALL BE OF THE CLASS AND TYPE INDICATED AND SHALL BE CHOSEN FROM THE EROSION CONTROL PRODUCT ACCEPTABILITY LISTS.
- B. CLASS I: A SHORT-TERM DURATION (SIX MONTHS OR GREATER), LIGHT DUTY, ORGANIC MAT. NETTING SHALL BE NON-ORGANIC, PHOTODEGRADABLE OR BIODEGRADABLE NETTING. THE WEIGHT OF THE NETTING SHALL NOT EXCEED 15% OF THE TOTAL BLANKET WEIGHT. THE NETTING SHALL BE SUFFICIENTLY BONDED TO THE PARENT MATERIAL TO PREVENT SEPARATION FOR THE LIFE OF THE PRODUCT.
 - 1. TYPE A: A NETTED PRODUCT FOR USE ON SLOPES 2.5 TO 1 OR FLATTER WITH A MINIMUM PRODUCT PERMISSIBLE SHEAR STRESS OF 50 PA (1.0 LBS/FT²). NOT TO BE USED IN CHANNELS.
 - 2. TYPE B: A DOUBLE NETTED PRODUCT FOR USE ON SLOPES 2 TO 1 OR FLATTER OR IN CHANNELS WITH A MINIMUM PRODUCT PERMISSIBLE SHEAR STRESS OF 70 PA (1.5 LBS/FT²).
- C. CLASS II: A LONG-TERM DURATION (3 YEARS OR GREATER), ORGANIC MAT. THE WEIGHT OF THE NETTING SHALL NOT EXCEED 15% OF THE TOTAL BLANKET WEIGHT. THE NETTING SHALL BE BONDED SUFFICIENTLY TO THE PARENT MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL FOR THE LIFE OF THE PRODUCT.
 - 1. TYPE A: JUTE FIBER ONLY TO BE USED FOR REINFORCING SOD.
 - 2. TYPE B: FOR USE ON SLOPES 2:1 OR FLATTER, OR IN CHANNELS WITH A MINIMUM PRODUCT PERMISSIBLE SHEAR STRESS OF 95 PA (2.0 LBS/FT²). NON-ORGANIC, PHOTODEGRADABLE, OR BIODEGRADABLE NETTING ALLOWED.
 - 3. TYPE C: FOR USE ON SLOPES 2:1 OR FLATTER, OR IN CHANNELS WITH A MINIMUM PRODUCT PERMISSIBLE SHEAR STRESS OF 95 PA (2.0 LBS/FT²). ONLY 100% ORGANIC FIBERS ENVIRONMENTALLY SENSITIVE AREAS THAT HAVE A HIGH PROBABILITY OF ENTRAPPING ANIMALS IN THE PLASTIC NETTING.
- D. STAPLES: U-SHAPED NO. 11 GAUGE OR GREATER WIRE WITH A SPAN WIDTH OF ONE TO TWO INCHES AND A LENGTH OF NOT LESS THAN 6 INCHES FOR FIRM SOIL AND 12 INCHES FOR LOOSE SOIL.

2.06 SOIL STABILIZER

- A. SOIL STABILIZER SHALL BE A POLYACRYLAMIDE (PAM) AND CALCIUM SOLUTION INTENDED TO REDUCE THE ERODIBILITY OF BARE SOILS. THE PRODUCT SHALL ACHIEVE AN 80% REDUCTION IN SOIL LOSS INDUCED BY A TWO INCH PER HOUR RAINFALL SIMULATOR.
- B. PAM MIXTURES SHALL BE ENVIRONMENTALLY BENIGN, HARMLESS TO FISH, AQUATIC ORGANISMS, WILDLIFE, AND PLANTS. ONLY ANIONIC PAM WILL BE PERMITTED.
- C. ANIONIC PAM, IN PURE FORM SHALL HAVE NO MORE THAN 0.05% FREE ACRYLIC MONOMER BY WEIGHT, AS ESTABLISHED BY THE FOOD AND DRUG ADMINISTRATION AND THE ENVIRONMENTAL PROTECTION AGENCY. THE ANIONIC PAM IN PURE FORM SHALL NOT EXCEED 200 POUNDS PER BATCH.
- D. THE PRODUCT PROVIDED SHALL BE LISTED IN THE WISDOT PAL FOR TYPE B SOIL STABILIZER.

2.07 INLET PROTECTION

- A. TYPE A: USE AROUND FIELD INLETS UNTIL PERMANENT STABILIZATION METHODS HAVE BEEN ESTABLISHED. USE ON PAVEMENT INLETS PRIOR TO INSTALLATION OF CURB AND GUTTER OR PAVEMENT.
- B. TYPE B: USE ON INLETS WITHOUT CURB HEAD AFTER CASTING AND GRATE ARE IN PLACE.
- C. TYPE C: USE ON STREET INLETS WITH CURB HEAD.
- D. TYPE D: USE IN AREAS WHERE OTHER TYPED OF INLET PROTECTION ARE INCOMPATIBLE WITH ROADWAY AND TRAFFIC CONDITIONS CAUSING POSSIBLE SAFETY HAZARDS WHEN PONDING OCCURS AT INLET.
- E. GEOTEXTILE: TYPE FF MEETING THE REQUIREMENTS OF THE LATEST EDITION OF WISDOT PAL.

PART 3 - EXECUTION

3.01 INSTALLATION OF DIVERSIONS

- A. TEMPORARY DIVERSIONS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH WDNR CONSERVATION PRACTICE STANDARD, CONSTRUCTION SITE DIVERSION (1066).

3.02 INSTALLATION OF SILT FENCE AND STRAW BALE BARRIERS

- A. INSTALL STRAW BALE BARRIERS IN ACCORDANCE WITH THE DRAWINGS AND WDNR CONSERVATION PRACTICE STANDARD, SEDIMENT BALE BARRIER (1055).
- B. INSTALL SILT FENCE IN ACCORDANCE WITH THE DRAWINGS AND WDNR CONSERVATION PRACTICE STANDARD, SILT FENCE (1056).
- C. SILT FENCE AND STRAW BALE BARRIERS SHALL BE PLACED ON THE CONTOUR TO THE EXTENT PRACTICABLE. PLACE FENCES PARALLEL TO THE SLOPE WITH THE ENDS OF THE FENCE TURNED UPSLOPE A DISTANCE OF ONE TO TWO FEET. THE PARALLEL SPACING SHALL NOT EXCEED THE MAXIMUM SLOPE LENGTHS AS INDICATED IN THE FOLLOWING TABLE:

FENCE AND BARRIER SPACING	
SLOPE	SPACING
<2%	100'
2 - 5%	75'
5 - 10%	50'
10 - 33%	25'
>33%	20'

3.03 TEMPORARY SEEDING

- A. PROVIDE A SEEDBED OF LOOSE SOIL TO A MINIMUM DEPTH OF 2 INCHES.
- B. APPLY SEED EVENLY AT THE RATE SHOWN IN THE FOLLOWING TABLE. RAKE OR DRAG TO COVER THE SEED TO A DEPTH OF 1/4 INCH.

SPECIES	LBS./ACRE
OATS	131
CEREAL RYE	131
WINTER WHEAT	131
ANNUAL RYEGRASS	80

3.04 EROSION MAT INSTALLATION

- A. REMOVE STONES, CLODS, STICKS, OR OTHER FOREIGN MATERIAL THAT WOULD DAMAGE THE MAT OR INTERFERE WITH THE MAT BEARING COMPLETELY ON THE SURFACE.
- B. INSTALL EROSION MAT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- C. AFTER SEEDING HAS BEEN COMPLETED, ROLL BLANKETS OUT PARALLEL TO THE DIRECTION OF WATER FLOW, WITH THE NETTING ON TOP. SPREAD THE BLANKETS WITHOUT STRETCHING, MAKING SURE THE FIBERS ARE IN CONTACT WITH THE SOIL. OVERLAP ADJACENT STRIPS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. OVERLAP STRIP ENDS A MINIMUM OF 10 INCHES WITH THE UPGRADE STRIP ON TOP. BURY THE UPGRADE END OF EACH STRIP IN A VERTICAL TRENCH AT LEAST 6 INCHES DEEP.
- D. STAPLE THE MAT STRIPS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. STAPLE LONGITUDINAL OVERLAPS AND OUTER EDGES AT MAXIMUM INTERVALS OF 3 FEET. STAPLE STRIP ENDS AT MAXIMUM INTERVALS OF 16 INCHES. PLACE STAPLES THROUGHOUT THE MAT AT MAXIMUM 3-FOOT INTERVALS. INSERT STAPLES FLUSH WITH THE GROUND SURFACE.

3.05 SOIL STABILIZER

- A. THE MANUFACTURER SHALL PROVIDE DETAILED WRITTEN INSTRUCTIONS ON THE STORAGE, MIXING, AND APPLICATION PROCEDURES.
- B. THE SOIL STABILIZER MAY BE APPLIED BY SPRAYING OR BY DRY SPREADING.
- C. APPLICATION RATES: APPLY AT THE RATE RECOMMENDED BY THE MANUFACTURER.
- D. DO NOT APPLY WITHIN 30 FEET OF BODY OF WATER (I.E. LAKE, RIVER, STORMWATER POND).

3.06 DITCH EROSION CONTROL

- A. THE FOLLOWING EROSION CONTROL MEASURES ARE MINIMUM REQUIREMENTS FOR ALL DITCHES. THE DRAWINGS MAY INCLUDE MORE SPECIFIC MEASURES.

DITCH EROSION CONTROL		
SLOPE RANGE	METHOD	BALE CHECKS
0 - 1%	SEED AND MULCH	NONE
1% - 4%	SEED AND MULCH WITH EROSION MAT	1% - 2%; EVERY 200'
		2% - 4%; EVERY 100'
4% - 6%	STAKED SOD	EVERY 75'
>6%	STAKED SOD AND/OR RIPRAP AS SPECIFIED BY ENGINEER ON DRAWINGS	EVERY 75' FOR SOD

- B. STONE DITCH CHECKS: UNLESS OTHERWISE INDICATED ON THE DRAWINGS, INSTALL STONE DITCH CHECKS AT INTERVALS OF ONE DITCH CHECK FOR EVERY TWO FEET OF DROP IN CHANNEL GRADE.

3.07 INSTALLATION OF SOD IN DITCHES

- A. LAY SOD SO THAT JOINTS OF ABUTTING ENDS OF STRIPS ARE NOT CONTINUOUS. LAY EACH STRIP SNUGLY AGAINST PREVIOUSLY LAID STRIPS.
- B. ROLL OR FIRMLY TAMP SOD TO PRESS THE SOD INTO THE UNDERLYING SOIL.
- C. TURN THE UPPER EDGES OF THE STRIPS INTO THE SOIL.
- D. STAKE STRIPS ALONG THE LONGITUDINAL AXIS AT 18-INCH INTERVALS AND NEAR THE TOP EDGE OF THE STRIP. PROVIDE WOOD LATH OR SIMILAR STAKES, 12 INCHES LONG. LEAVE TOP OF STAKE APPROXIMATELY 1/2 INCH ABOVE SOD SURFACE.

3.08 INSTALLATION OF OTHER FACILITIES

- A. INLET PROTECTION BARRIERS, CHANNEL STABILIZATION, GRASSSED WATERWAYS, ROCK LINED WATERWAYS, SEDIMENTS TRAPS, SEDIMENT BASINS, AND OTHER FORMS OF EROSION CONTROL MEASURES SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH WDNR TECHNICAL STANDARDS.

3.09 MAINTENANCE

- A. INSPECT DIVERSIONS WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAINFALL, UNTIL THE VEGETATIVE COVER IS STABILIZED. MAKE NECESSARY REPAIRS IMMEDIATELY.
- B. INSPECT FILTER FABRIC FENCES AND BARRIERS WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAINFALL. NECESSARY REPAIRS OR REPLACEMENT SHALL BE MADE IMMEDIATELY. REMOVE SEDIMENT DEPOSITS WHEN DEPOSITS REACH ONE-HALF THE HEIGHT OF THE FENCE. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR REPLACING FABRIC DUE TO WEATHERING.
- C. INSPECT STRAW BALE FENCES AND BARRIERS WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAINFALL. NECESSARY REPAIRS OR REPLACEMENT SHALL BE MADE IMMEDIATELY. REMOVE SEDIMENT DEPOSITS WHEN DEPOSITS REACH ONE-THIRD THE HEIGHT OF THE BALES. REPLACE BALES AFTER THREE MONTHS.
- D. INSPECT ALL SEEDING, SOD, MULCHES, MATS AND NETS WITHIN 24 HOURS AFTER EACH RAINFALL OR DAILY DURING PERIODS OF PROLONGED RAINFALL. ADDITIONAL MULCH, NETTING OR MATTING SHALL BE APPLIED IMMEDIATELY WHEN NECESSARY TO MAINTAIN SUITABLE COVERAGE. MAKE INSPECTIONS UNTIL VEGETATIVE COVER IS ESTABLISHED. WATER SEEDING AND SOD WHEN NECESSARY TO PROMOTE ESTABLISHMENT.
- E. ALL OTHER SOIL EROSION CONTROL MEASURES SHOULD BE INSPECTED AND REPAIRED IMMEDIATELY, IF REQUIRED, WITHIN 24 HOURS AFTER STORM EVENT OR DAILY DURING PERIODS OF PROLONGED RAINFALL.

3.10 REMOVAL

- A. AFTER FINAL VEGETATION IS ESTABLISHED, REMOVE BALES, SILT FENCES, DITCH CHECKS, DIVERSIONS, AND OTHER EROSION CONTROL FACILITIES. RESTORE AREAS DISTURBED BY THE REMOVALS.

3.11 MONITORING FOR WPDES PERMIT

- A. UNLESS INDICATED OTHERWISE WITHIN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MONITORING REQUIREMENTS OF THE WPDES PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
- B. EROSION AND SEDIMENT CONTROLS SHALL BE ROUTINELY INSPECTED AT LEAST EVERY SEVEN DAYS, AND WITHIN 24 HOURS AFTER A PRECIPITATION EVENT OF 0.5 INCHES OR GREATER. WEEKLY WRITTEN REPORTS OF ALL INSPECTIONS SHALL BE MAINTAINED AND SUBMITTED TO THE ENGINEER. THE REPORTS SHALL CONTAIN THE FOLLOWING INFORMATION:
 - DATE, TIME, AND EXACT PLACE OF INSPECTION.
 - NAME(S) OF INDIVIDUAL(S) PERFORMING INSPECTION.
 - AN ASSESSMENT OF THE CONDITION OF EROSION AND SEDIMENT CONTROLS.
 - A DESCRIPTION OF ANY EROSION AND SEDIMENT CONTROL IMPLEMENTATION AND MAINTENANCE PERFORMED.
 - A DESCRIPTION OF THE SITES PRESENT PHASE OF CONSTRUCTION.
- C. THE ENGINEER WILL PROVIDE THE CONTRACTOR WITH THE APPROPRIATE DNR FORM TO USE FOR THE INSPECTIONS.



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EROSION CONTROL SPECIFICATIONS
 Schumacher Farm Center for Rural Heritage
 Town of Westport
 Dane County, WI

NO.	BY	DATE
1	LAL	05/09/2017



REVISIONS
 Bidding Documents

DRAWN BY LAL
 REVIEWED BY KDA
 ISSUE DATE 3/11/2016
 GEC FILE NO. 2-0116-72
 SHEET NO.

**DANE COUNTY
SCHUMACHER BARN
REMODEL / SITE
IMPROVEMENTS**

5682 State Hwy 19
Westport, WI 53597

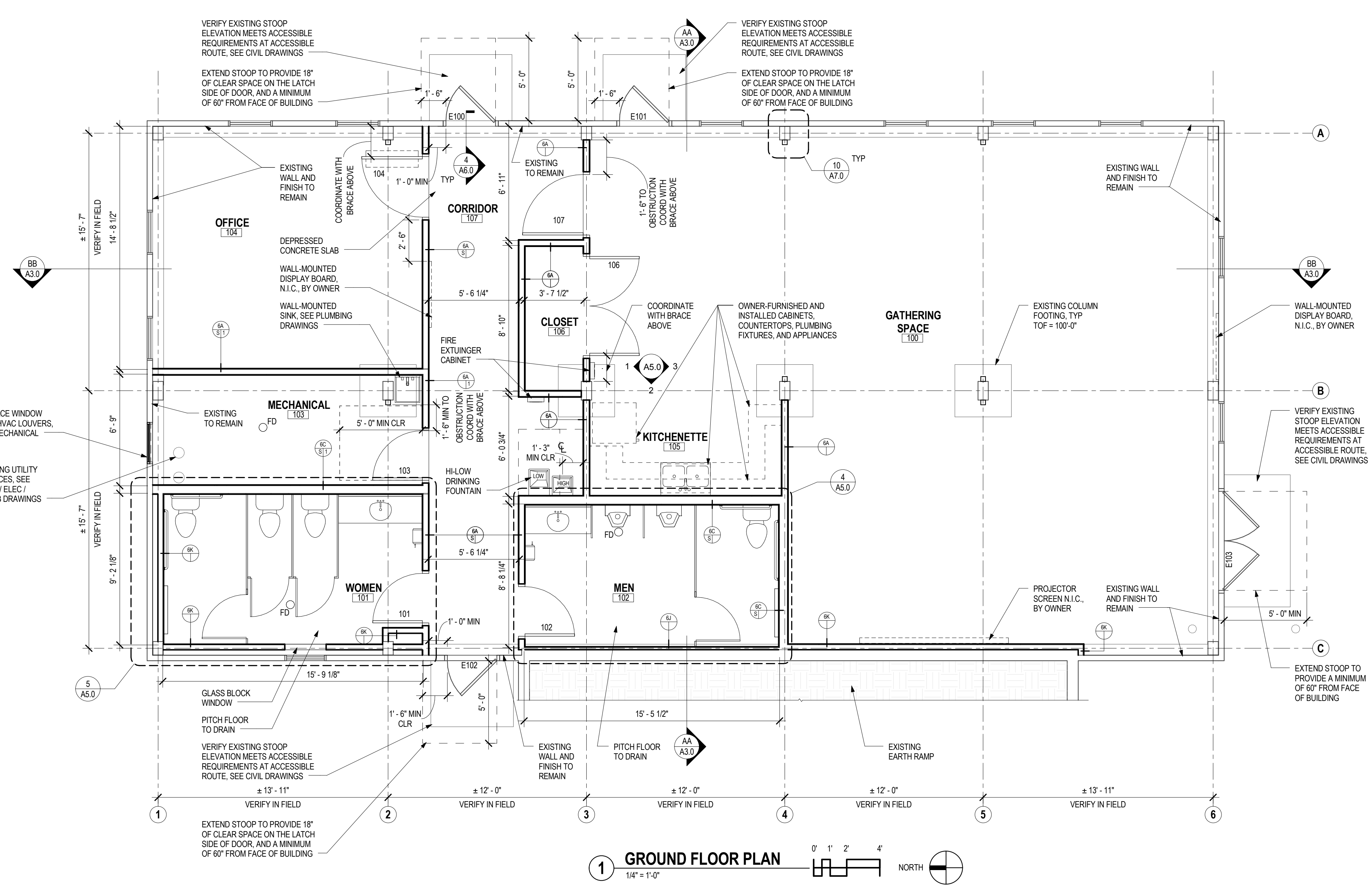
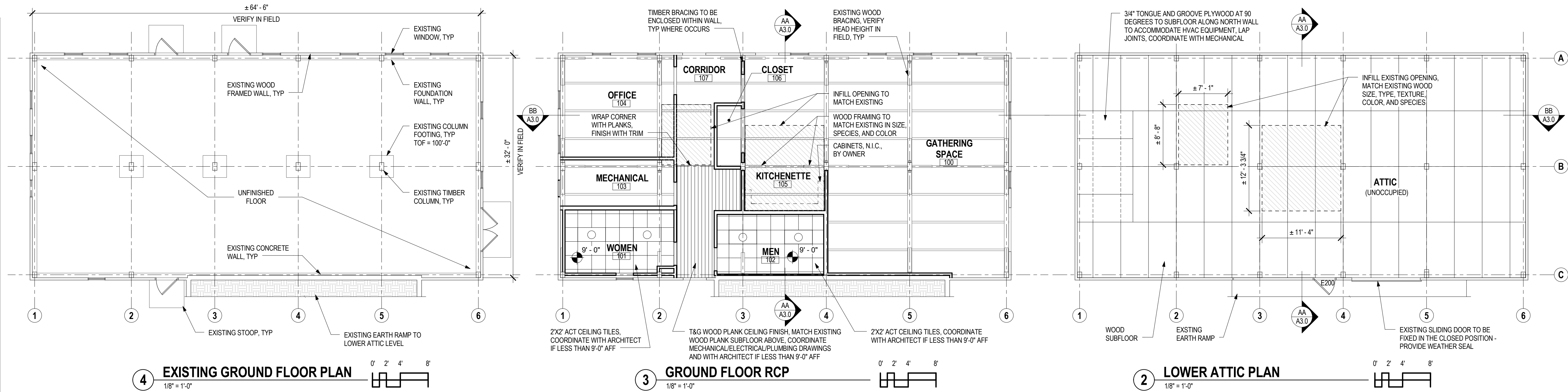
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REVISIONS:

PROJECT # 14099

**FLOOR PLANS AND
REFLECTED
CEILING PLAN**

A1.1



- FLOOR PLAN GENERAL NOTES**
- SEE SHEET A7.0 FOR INTERIOR ELEVATIONS.
 - VERIFY SIZE AND LOCATIONS OF ALL MECHANICAL OPENINGS. GENERAL CONTRACTOR TO PAINT AND SEAL LOUVER PERIMETER, TYPICAL.
 - GENERAL CONTRACTOR TO PROVIDE CONCRETE EQUIPMENT PADS/CURBS AS REQUIRED FOR MECHANICAL/ELECTRICAL/PLUMBING EQUIPMENT. VERIFY SIZE/PROFILE/LOCATION WITH PLUMBING/MECHANICAL/ELECTRICAL.
 - GENERAL CONTRACTOR TO PROVIDE WOOD BLOCKING BETWEEN WOOD STUDS AS REQUIRED FOR CASEWORK/HANDRAIL/TOILET ACCESSORIES ETC. MOUNTING.
 - VERIFY ALL ACTUAL CHASE DIMENSIONS WITH HVAC CONTRACTOR.
 - ADA CLEARANCE CIRCLES AND BOXES SHOWN ON PLAN ARE FOR INFORMATION PURPOSES ONLY.
 - DIMENSIONS ARE FROM FINISHED SURFACE OF EXISTING, OR FROM FACE OF STUD IN NEW WORK, UNLESS NOTED OTHERWISE.
 - PROVIDE RADIANT FLOOR SLAB HEATING SYSTEM, SEE MECHANICAL.
 - EXISTING WINDOWS AND DOORS TO BE INSPECTED FOR LEAKS AND DAMAGE. RESEAL, REPAIR, AND REPAINT AS REQUIRED.
 - NO PENETRATIONS OR ALTERATIONS TO EXISTING COLUMN FOOTINGS.
 - EXISTING CONDITIONS AND DIMENSIONS TO BE VERIFIED PRIOR TO THE START OF WORK, INCLUDING AT TIMBER BRACING NEAR WALLS AND DOORS.
 - SEE A9.0 FOR ROOM FINISHES AND JOINTS IN CONCRETE SLAB. COORDINATE SLAB CONTROL JOINTS WITH RADIANT HEATING SYSTEM.
 - DEPRESS CONCRETE SLAB BY THICKNESS OF INSTALLED CERAMIC TILE. SEE FLOOR FINISH INFORMATION ON A9.0. COORDINATE WITH RADIANT FLOOR HEATING SYSTEM.

- REFLECTED CEILING PLAN GENERAL NOTES**
- PROVIDE CEILING GRID MAIN SUPPORT TEES AT LIGHT FIXTURES, DIFFUSERS, ETC. AS REQUIRED TO SUPPORT DEVICE.
 - REFER TO ELECTRICAL DRAWINGS FOR FIXTURE INFORMATION.
 - REFER TO HVAC DRAWINGS FOR FIXTURE/EQUIPMENT LOCATIONS.
 - ALL PIPING/CONDUIT/DUCTWORK TO BE HIDDEN OR TO RUN BETWEEN JOISTS AT EXPOSED FIRST FLOOR CEILING. COORDINATE WITH ARCHITECT WHERE NOT POSSIBLE.
 - CENTER LIGHT FIXTURES, FIRE SPRINKLER HEADS, DIFFUSERS AND OTHER FIXTURES WITHIN CEILING TILE PANELS WHERE POSSIBLE, UNLESS NOTED OTHERWISE.

REFLECTED CEILING LEGEND

	2x2 CEILING GRID
	TONGUE & GROOVE WOOD PLANK SOFFIT
	EXPOSED TO STRUCTURE
	FLOOR INFILL
	2x4 LIGHT FIXTURE



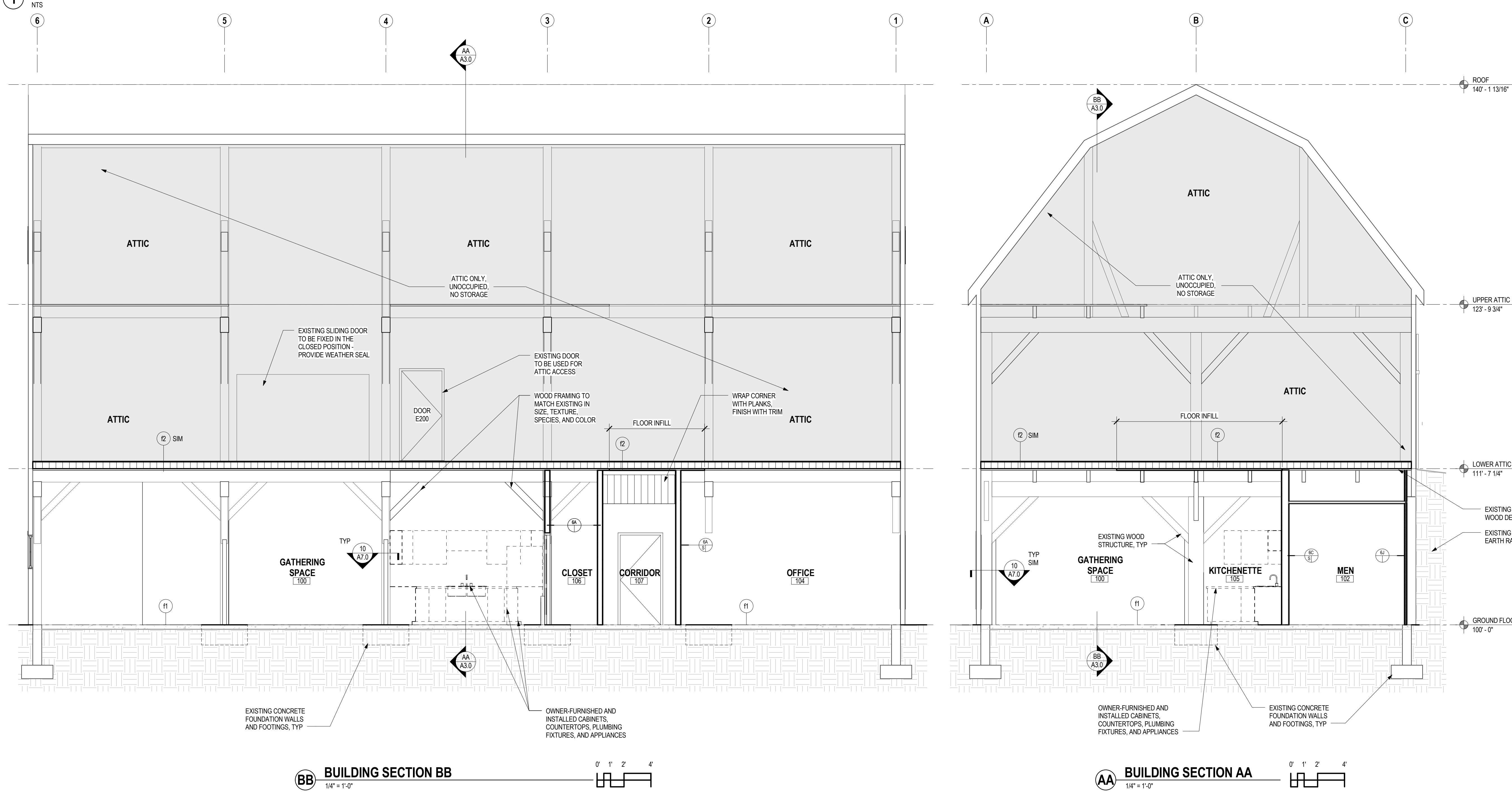
DIMENSION

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1 PROJECT IMAGES - EXISTING CONDITIONS



**DANE COUNTY
SCHUMACHER BARN
REMODEL / SITE
IMPROVEMENTS**

5682 State Hwy 19
Westport, WI 53597

DATE OF ISSUE: 04/25/2017

REVISIONS:

NO.	DESCRIPTION

PROJECT # 14099

**BUILDING
SECTIONS**

A3.0

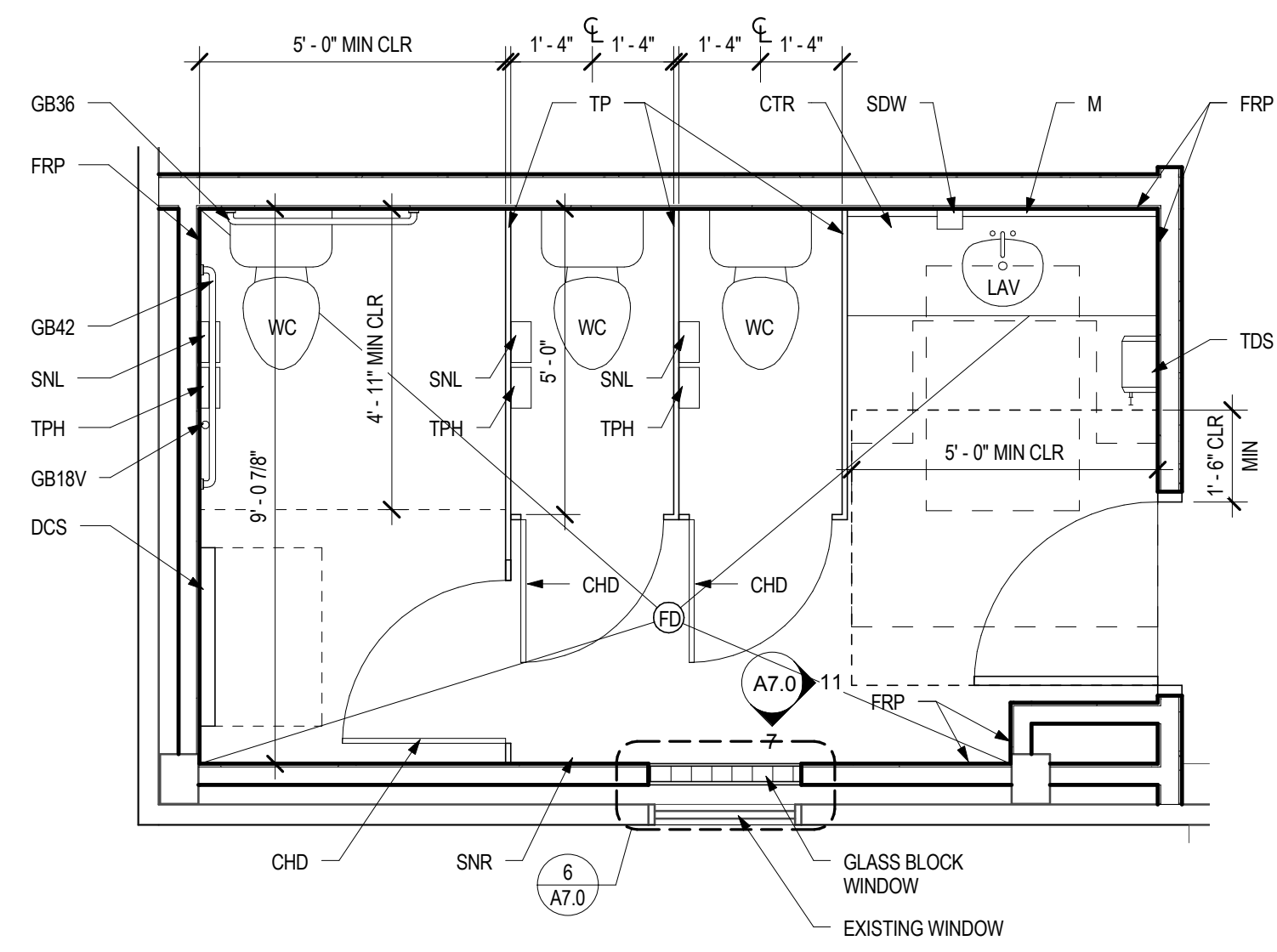
**DANE COUNTY
SCHUMACHER BARN
REMODEL / SITE
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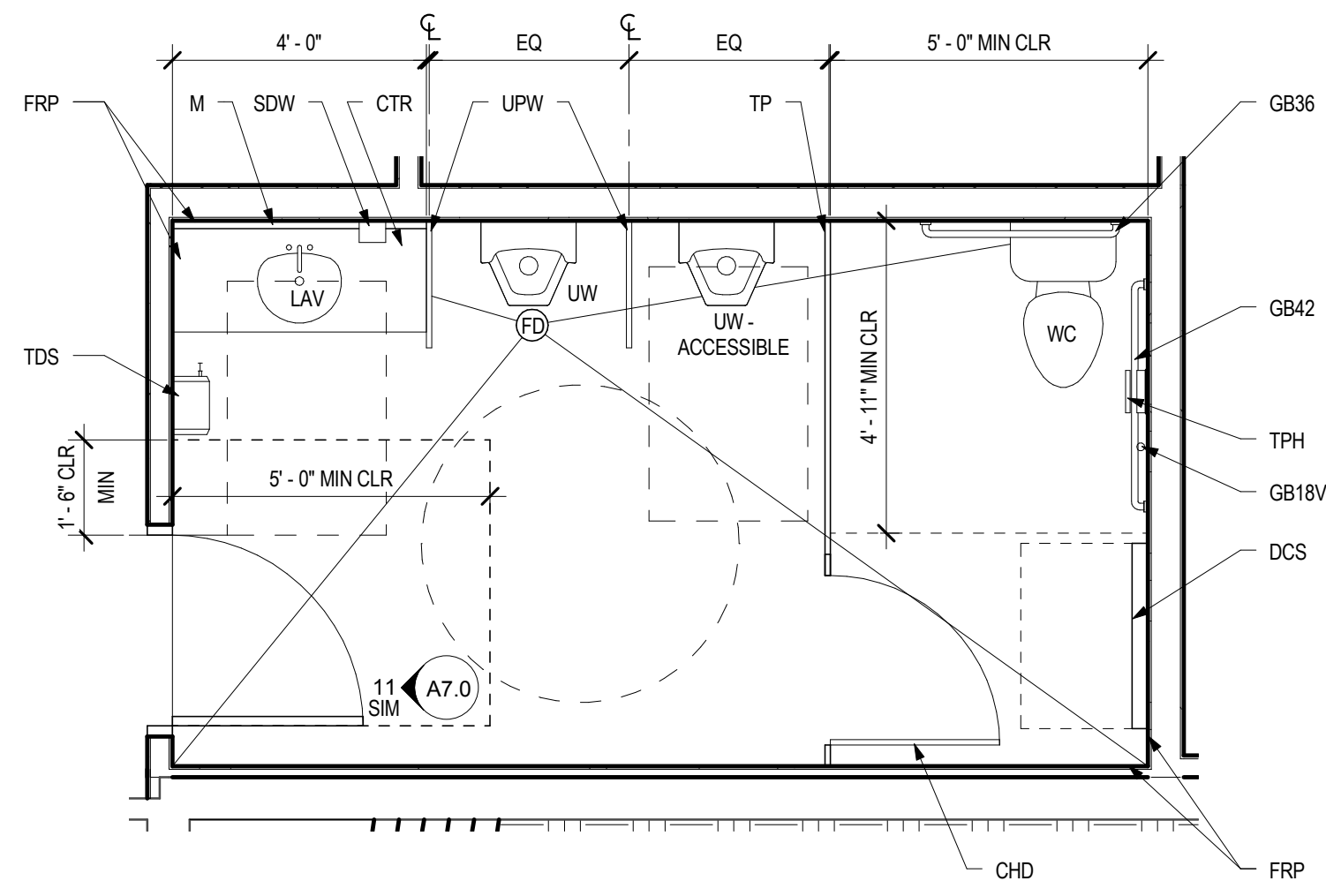
ACCESSORY SCHEDULE - PUBLIC TOILET ROOMS		
ABBREVIATION	ITEM	REMARKS
CHD	CLOTHES HOOK - MOUNTED ON PARTITION DOOR	-
CTR	COUNTER	-
DCS	DIAPER CHANGING STATION - WALL MOUNTED	SEE NOTE '3'
FD	FLOOR DRAIN	-
FRP	FIBER REINFORCED PANELS	FULL-HEIGHT FRP
GB18V	18" GRAB BAR - VERTICAL	-
GB36	36" GRAB BAR	-
GB42	42" GRAB BAR	-
LAV	LAVATORY	-
M	MIRROR - 24" WIDE x 36" HIGH	-
SDW	SOAP DISPENSER - WALL MOUNTED	-
SNR	SANITARY NAPKIN DISPENSER	-
SNL	SANITARY NAPKIN DISPOSAL	-
TDS	TOWEL DISPENSER - SURFACE MOUNTED	-
TP	TOILET PARTITION	-
TPH	TOILET PAPER HOLDER	-
UPW	URINAL PARTITION - 24" D x 48" H, WALL MOUNTED	-
UW	URINAL - WALL MOUNTED	-
WC	WATER CLOSET	-

- SCHEDULE NOTES:**
- TOILET ROOMS WITH MORE THAN ONE TDS, THE SECOND AND ADDITIONAL TDS WILL BE MOUNTED SO THAT THE TOWEL DISPENSER OUTLET IS 54" AFF
 - TRASH RECEPTACLES N.I.C.
 - DCS BABY STATION TO BE 34" AFF MAX. TO TOP OF CHANGING SURFACE WHEN OPEN COMPLETELY. TOTAL DEPTH OF UNIT WHEN OPEN TO BE NO MORE THAN 24" MEASURED FROM THE WALL ON WHICH IT IS MOUNTED.

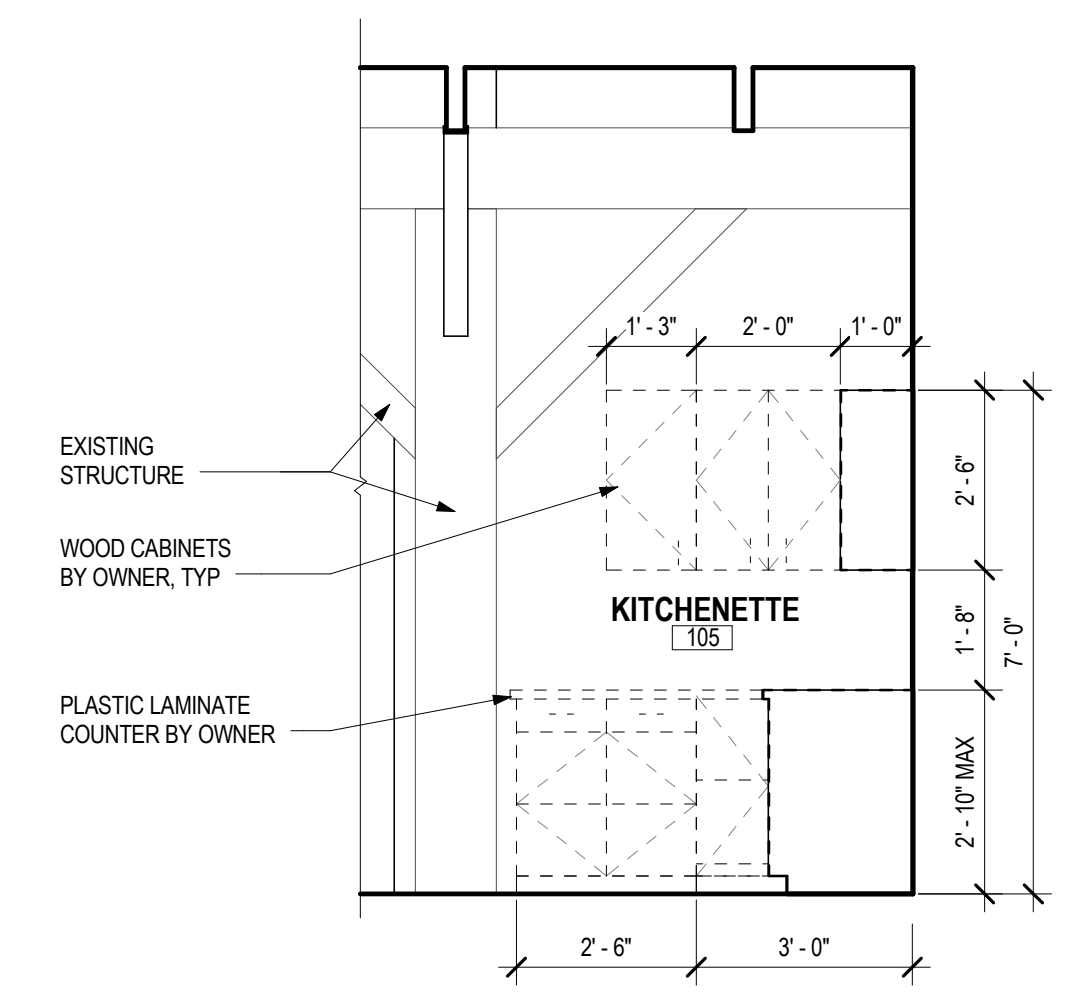
- GENERAL TOILET ROOM NOTES:**
- PROVIDE BLOCKING AS NECESSARY FOR MOUNTING THERMOSTATS, GRAB BARS, DOOR STOPS FINISH CARPENTRY AND TRIM CABINETS, SHELVING, AND ALL ACCESSORIES AND FIXTURES
 - DASHED ADA CLEARANCE AREA, CIRCLES, RECTANGLES SHOWN FOR INFORMATIONAL PURPOSES ONLY
 - REFER TO PLUMBING DRAWINGS FOR PLUMBING FIXTURES
 - SEE A7.0 FOR ALL HEIGHTS GIVEN BY ELEVATION AND SCHEDULE NOTES FOR ADDITIONAL INFORMATION
 - RESTROOM FLOOR FINISH MATERIALS SHALL HAVE A SMOOTH, HARD, NONABSORBENT SURFACE
 - PITCH FLOORS TO DRAIN, 1:48 MAX SLOPE



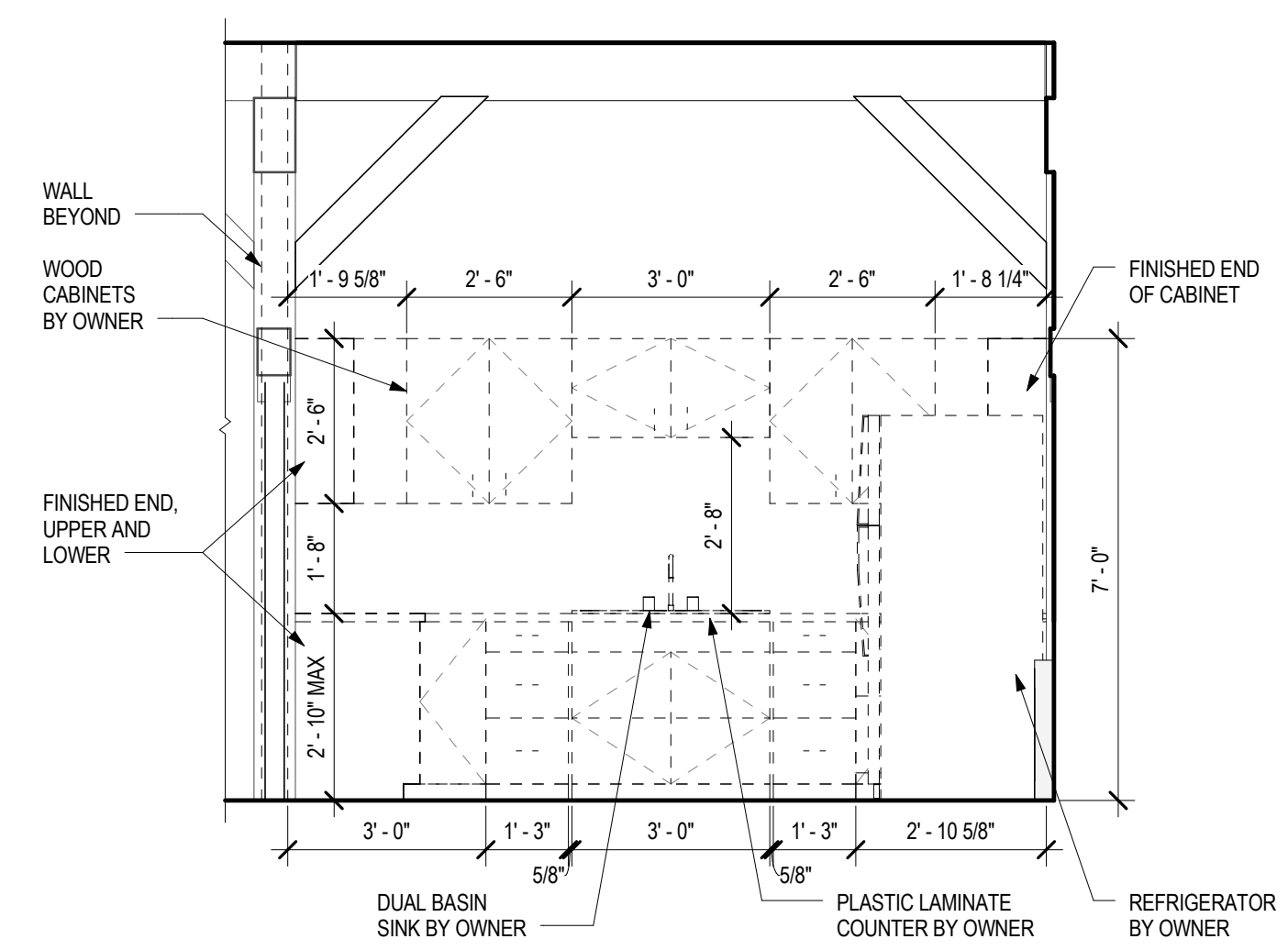
5 ENLARGED WOMEN'S RESTROOM PLAN
3/8" = 1'-0"
0' 8" 1'-4" 2'-8"
NORTH



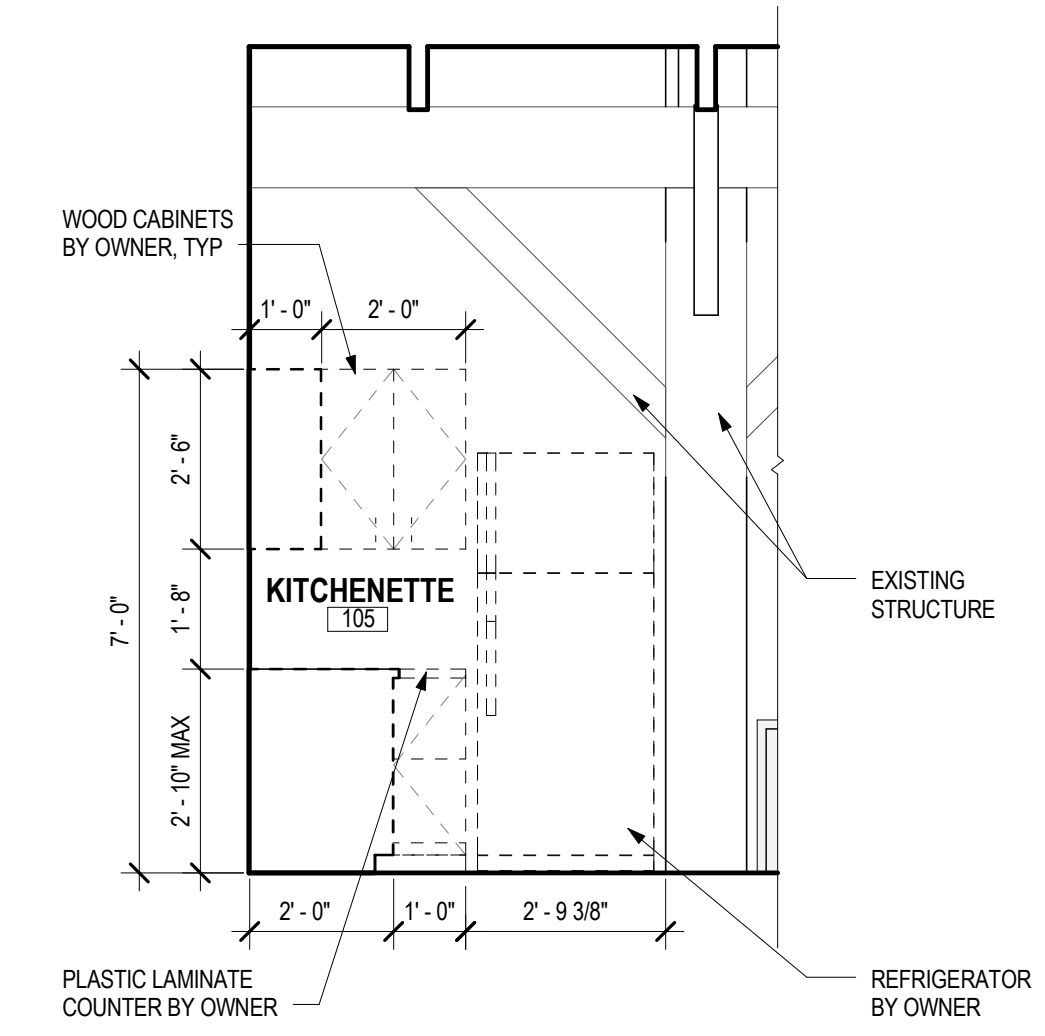
4 ENLARGED MEN'S RESTROOM PLAN
3/8" = 1'-0"
0' 8" 1'-4" 2'-8"
NORTH



3 KITCHENETTE SOUTH ELEVATION
3/8" = 1'-0"
0' 8" 1'-4" 2'-8"



2 KITCHENETTE WEST ELEVATION
3/8" = 1'-0"
0' 8" 1'-4" 2'-8"
NOTE:
ALL DRAWERS AND CABINETS TO BE LOCKABLE



1 KITCHENETTE NORTH ELEVATION
3/8" = 1'-0"
0' 8" 1'-4" 2'-8"

DATE OF ISSUE: 04/25/2017

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PROJECT # 14099

**RESTROOM PLANS
AND KITCHENETTE
ELEVATIONS**

A5.0

DOOR SCHEDULE																
DOOR NO.	ROOM NAME	TYPE	DOOR			FRAME					GLAZE	FIRE RATING	HARDWARE	COMMENTS		
			W	H	T	ELEV	MATERIAL	UNDER CUT	ELEV	MATERIAL					HEAD	JAMB
GROUND FLOOR																
101	WOMEN	Single	3' - 0"	6' - 8"	1 3/4"	F	HM		A	HM	2/A6.0	2/A6.0		-	1	
102	MEN	Single	3' - 0"	6' - 8"	1 3/4"	F	HM		A	HM	2/A6.0	2/A6.0		-	1	
103	MECHANICAL	Single	3' - 0"	6' - 8"	1 3/4"	F	HM		A	HM	2/A6.0	2/A6.0		45 MIN	2	
104	OFFICE	Single-Dutch	3' - 8"	6' - 8"	1 3/4"	D	WD		A	WD	2/A6.0	2/A6.0		-	3	12" SHELF AT TOP OF LOWER DOOR
106	CLOSET	Double	6' - 0"	6' - 8"	1 3/4"	P	WD		B	WD	2/A6.0	2/A6.0		-	4	
107	CORRIDOR	Single	3' - 8"	6' - 8"	1 3/4"	F	WD		A	WD	2/A6.0	2/A6.0		-	5	
E100	CORRIDOR	Single	3' - 0"	6' - 8"	EXIST	--	EXISTING							-	9	HARDWARE TO BE ADA-APPROVED
E101	GATHERING SPACE	Single	3' - 0"	6' - 8"	EXIST	--	EXISTING							-	6	HARDWARE TO BE ADA-APPROVED
E102	CORRIDOR	Single	3' - 0"	6' - 8"	EXIST	--	EXISTING							-	9	HARDWARE TO BE ADA-APPROVED
E103	GATHERING SPACE	Double	6' - 0"	6' - 8"	EXIST	--	EXISTING							-	7	HARDWARE TO BE ADA-APPROVED
LOWER ATTIC																
E200		Single	3' - 0"	6' - 8"	EXIST	--	EXISTING							-	8	HARDWARE TO BE ADA-APPROVED

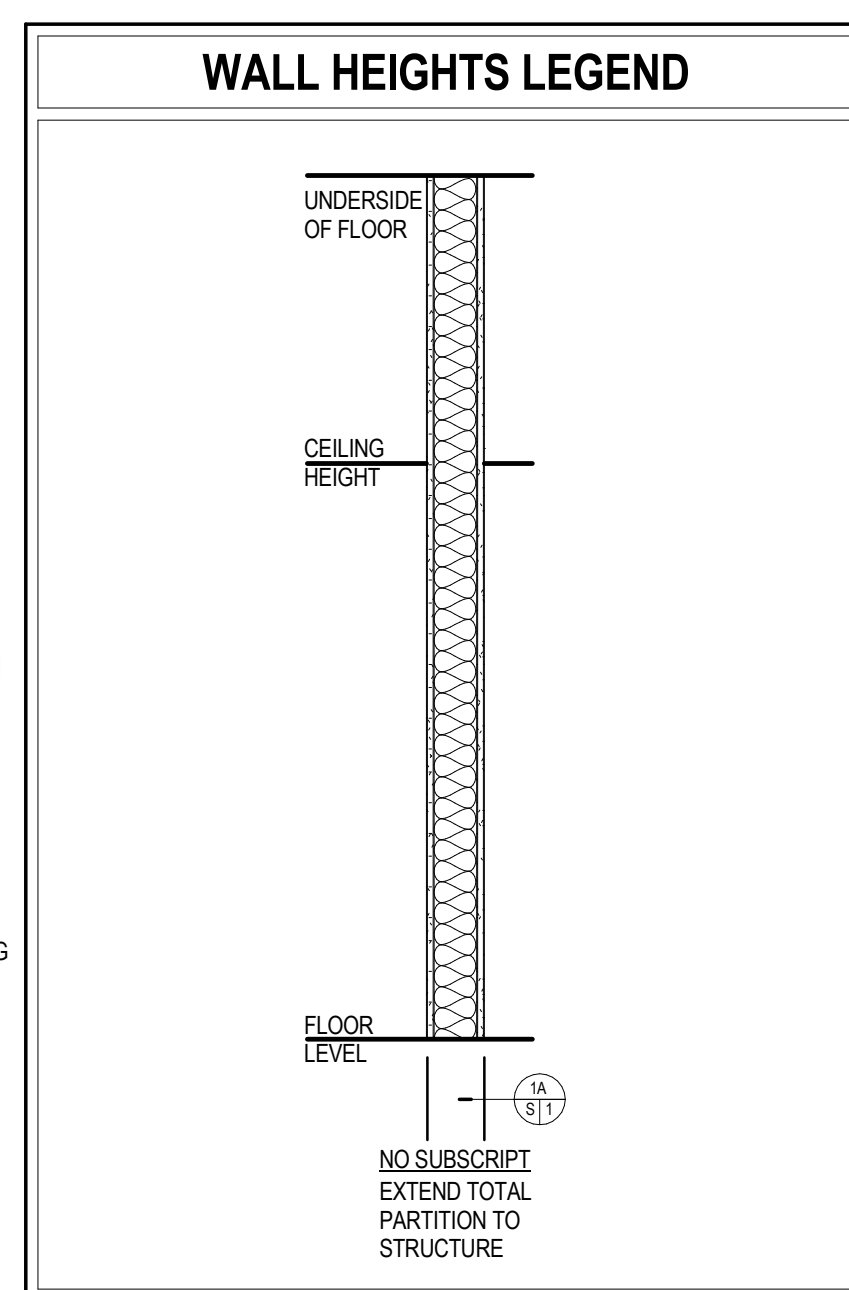
HARDWARE SCHEDULE									
SET #	LOCK SETS				CLOSER	MISC.	COMMENTS (SEE BELOW)		
	DEADBOLT	STOREROOM LOCK	OFFICE LOCK	DUTCH DOOR SURFACE BOLT					
1	X				X		1,4,8,13		
2		X			X		8		
3			X	X			3,7		
4		X					2,5,7		
5		X					8		
6					X	X	9,11		
7					X	X	2,6,9,11,12		
8	X	X			X		11		
9					X	X	9,10,11		

- ### DOOR SCHEDULE GENERAL NOTES
- WOOD DOORS TO BE PRE-FINISHED
 - HOLLOW METAL FRAME HEADS TO BE 2", U.N.O.
 - ALL SWING DOORS TO RECEIVE 1-1/2" PAIR HINGES, U.N.O.
 - PROVIDE LEVER HANDLE LOCK/LATCH SETS AT ALL DOORS, U.N.O.
 - ALL EXTERIOR DOORS TO RECEIVE WEATHER STRIP AND LOW PROFILE THRESHOLD
 - ALL NEW DOORS TO HAVE ADA APPROVED HARDWARE, OWNER APPROVED.
 - ALL PUBLIC ACCESS DOORS ALONG THE ACCESSIBLE ROUTE TO HAVE 32" MINIMUM CLEAR OPENING AND ADA HARDWARE.
 - REPLACE EXISTING DOOR KNOBS WITH ADA-APPROVED LEVERS, INTERIOR AND EXTERIOR
 - UPGRADE HARDWARE, SILLS, AND FRAMES TO MEET EGRESS REQUIREMENTS AT EXISTING DOORS
 - VERIFY LOCATIONS OF OVERHEAD OBSTRUCTIONS AT DOORS. OBSTRUCTIONS SHALL NOT RESTRICT OPERATION OF DOOR. COORDINATE WITH ARCHITECT.

- ### DOOR HARDWARE COMMENTS
- 1 SET PUSH/PULLS
 - INACTIVE LEVER ON INACTIVE LEAF
 - 4 HINGES
 - KICK PLATE (CORRIDOR SIDE ONLY), VERIFY SIZE AND MATERIAL WITH OWNER
 - INTEGRAL FLUSH BOLT, TOP ONLY, INACTIVE LEAF
 - AUTOMATIC FLUSH BOLT
 - 2 HINGE PIN STOPS
 - WALL BUMPER
 - LOW-PROFILE EXTERIOR THRESHOLD
 - ELECTRONIC STRIKE (LOW VOLTAGE WIRING AND SOFTWARE BY OWNER, SEE ELECTRICAL DRAWINGS)
 - WEATHER STRIPPING AND SWEEP
 - ASTRAGAL AND COORDINATOR
 - PRECUT OPENING FOR 20"X20" FLANGED ALUMINUM DOOR GRILLE, INSTALLED BY HVAC CONTRACTOR

- ### DOOR SCHEDULE LEGEND
- WD = WOOD
HM = HOLLOW METAL

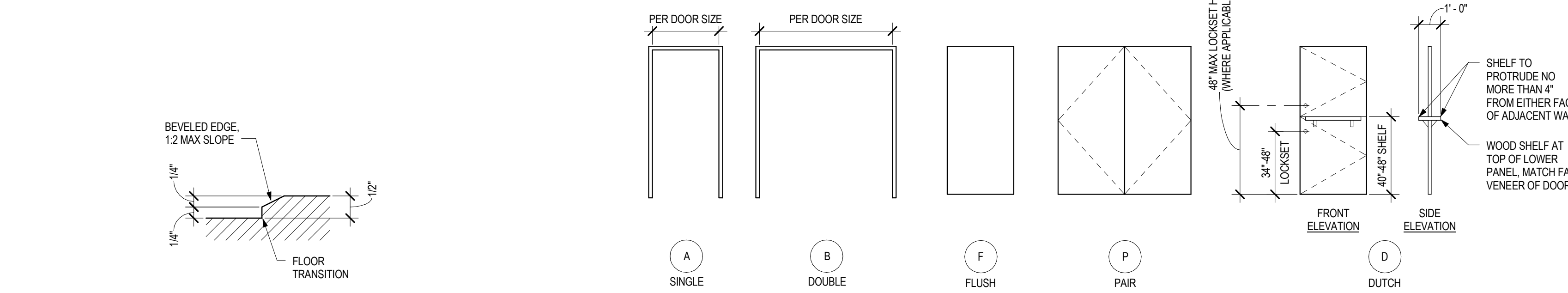
- ### WALL DETAIL NOTES
- TO ACHIEVE STC RATING, ADD FIBERGLASS BATT INSULATION TO THE ENTIRE WIDTH OF STUD CAVITY, TYP.



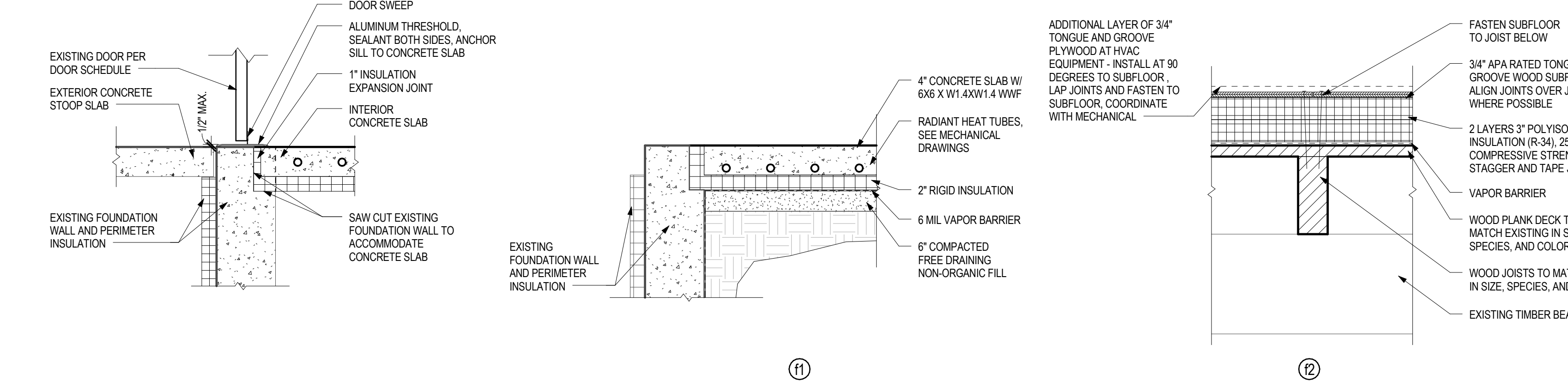
- ### WALL TYPE GENERAL NOTES
- CONTINUE ALL PARTITION FRAMING AND GYPSUM BOARD TO UNDERSIDE OF RATED ROOF ASSEMBLY OR FLOOR DECK ABOVE, UNLESS INDICATED OTHERWISE.
 - SOUND WALLS (INDICATED BY "STC" - SOUND TRANSFER COEFFICIENT); CAULK ALL UNFINISHED JOINTS BETWEEN GYPSUM BOARD PANELS AND BETWEEN GYPSUM BOARD PANELS AND FLOOR AND SIDE WALL MATERIALS WITH ONE BEAD OF SEALANT PER LAYER OF GYPSUM BOARD. ACOUSTICALLY SEAL ALL PENETRATIONS INCLUDING ELECTRICAL, MECHANICAL AND PIPING. LIMIT NECESSARY WALL PENETRATIONS TO ONE PER STUD CAVITY.
 - PENETRATIONS IN SOUND WALLS AND SMOKE AND FIRE RATED WALLS AND CONNECTIONS AT WALLS TO OTHER WORK SHALL MAINTAIN STC AND/OR FIRE RATINGS. SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDED DETAILS, AND SHALL COMPLY WITH APPLICABLE TESTING AGENCY REQUIREMENTS.
 - WHERE WALLS AND/OR FURRING MEET, MAINTAIN A FLUSH SURFACE ON THE SIDE WHERE WALL SURFACE IS STRAIGHT OR CONTINUOUS, UNLESS INDICATED OTHERWISE.
 - FIRE RATINGS SHOWN ARE THE RATINGS AVAILABLE PER NOTED TESTING AGENCY AND/OR IBC REQUIREMENTS. REFER TO FLOOR PLANS AND WALL TYPE SUBSCRIPTS FOR LOCATIONS OF FIRE RATED WALLS.
 - PROVIDE WOOD BLOCKING IN PARTITION TYPES AS REQUIRED BY SPECIFICATIONS AND ACCESSORIES INDICATED ON DRAWINGS.

- ### FLOOR AND ROOF TYPE GENERAL NOTES
- SUSPENDED CEILING GRIDS AND TILES NOT INDICATED ON FLOOR OR ROOF TYPES. REFER TO REFLECTED CEILING PLANS FOR SUSPENDED CEILING AND ADDITIONAL SOFFITS.

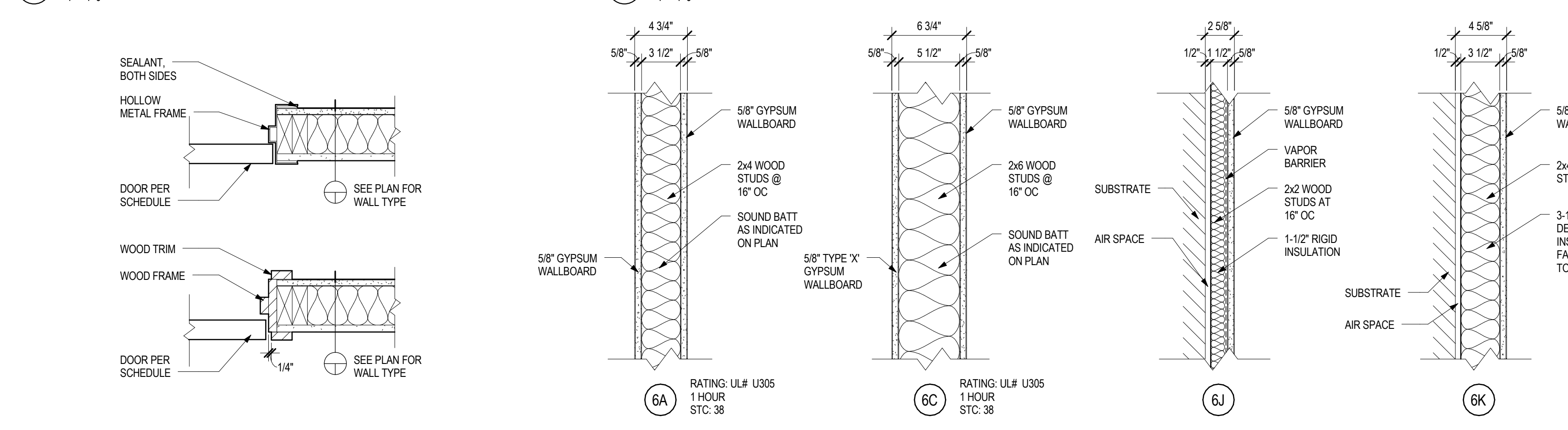
- ### FRAME WALL TYPE GENERAL NOTES
- PROVIDE FIRE RATED GYPSUM BOARD AT FIRE RATED PARTITIONS AS REQUIRED BY TESTED ASSEMBLY.
 - INSTALLATION OF GYPSUM BOARD, BACKER BOARD AND BASE BOARD SHALL CONFORM TO REQUIREMENTS FOR FIRE RATINGS AND ACOUSTICAL RATINGS.
 - STUD FRAMING TO BE 16" OC UNLESS NOTED OTHERWISE.
 - PROVIDE MOISTURE RESISTANT GYPSUM BOARD AT WALLS OF TOILET ROOMS.



7 VERTICAL TRANSITION DETAIL 6" = 1'-0"
6 DOOR FRAME ELEVATIONS 1/4" = 1'-0"
5 DOOR TYPE ELEVATIONS 1/4" = 1'-0"



4 FOUNDATION WALL CUT AT EXTERIOR DOOR 1" = 1'-0"
3 FLOOR TYPE DETAIL 1" = 1'-0"



2 DOOR JAMB @ INTERIOR PARTITION (HEAD SIM) 1 1/2" = 1'-0"
1 WALL TYPE DETAILS 1 1/2" = 1'-0"

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DANE COUNTY SCHUMACHER BARN REMODEL / SITE IMPROVEMENTS

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PROJECT # 14099

DOOR AND WALL TYPES AND SCHEDULES

A6.0

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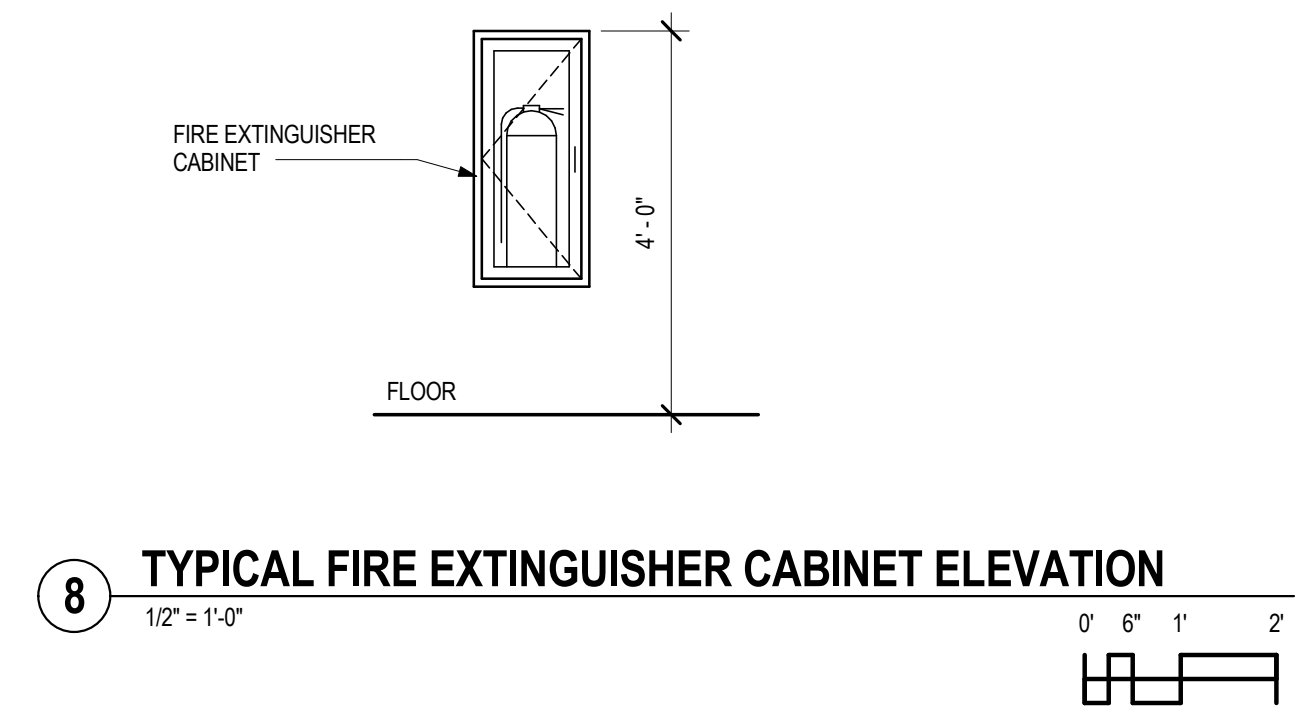
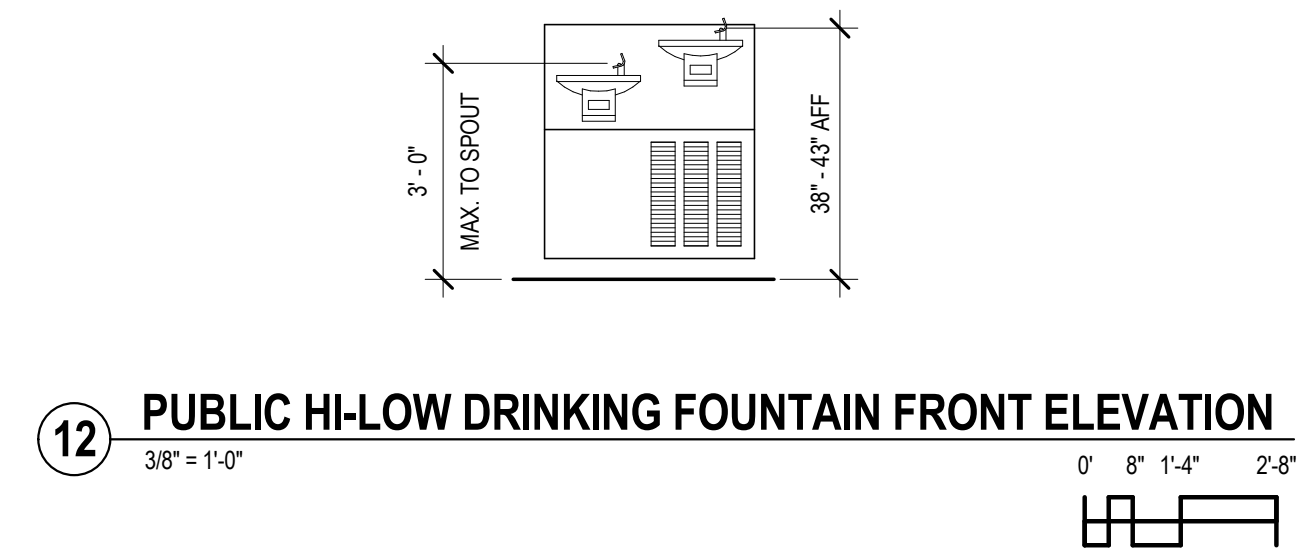
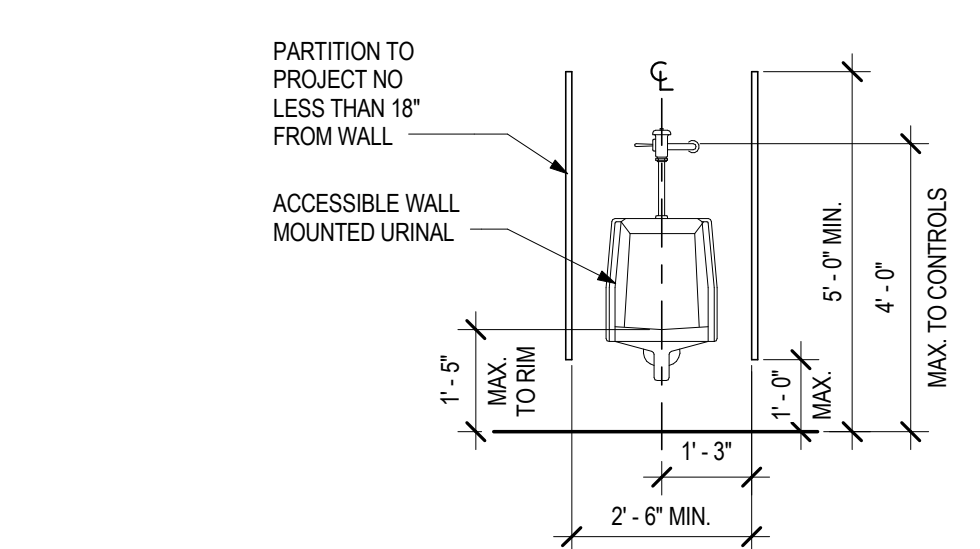
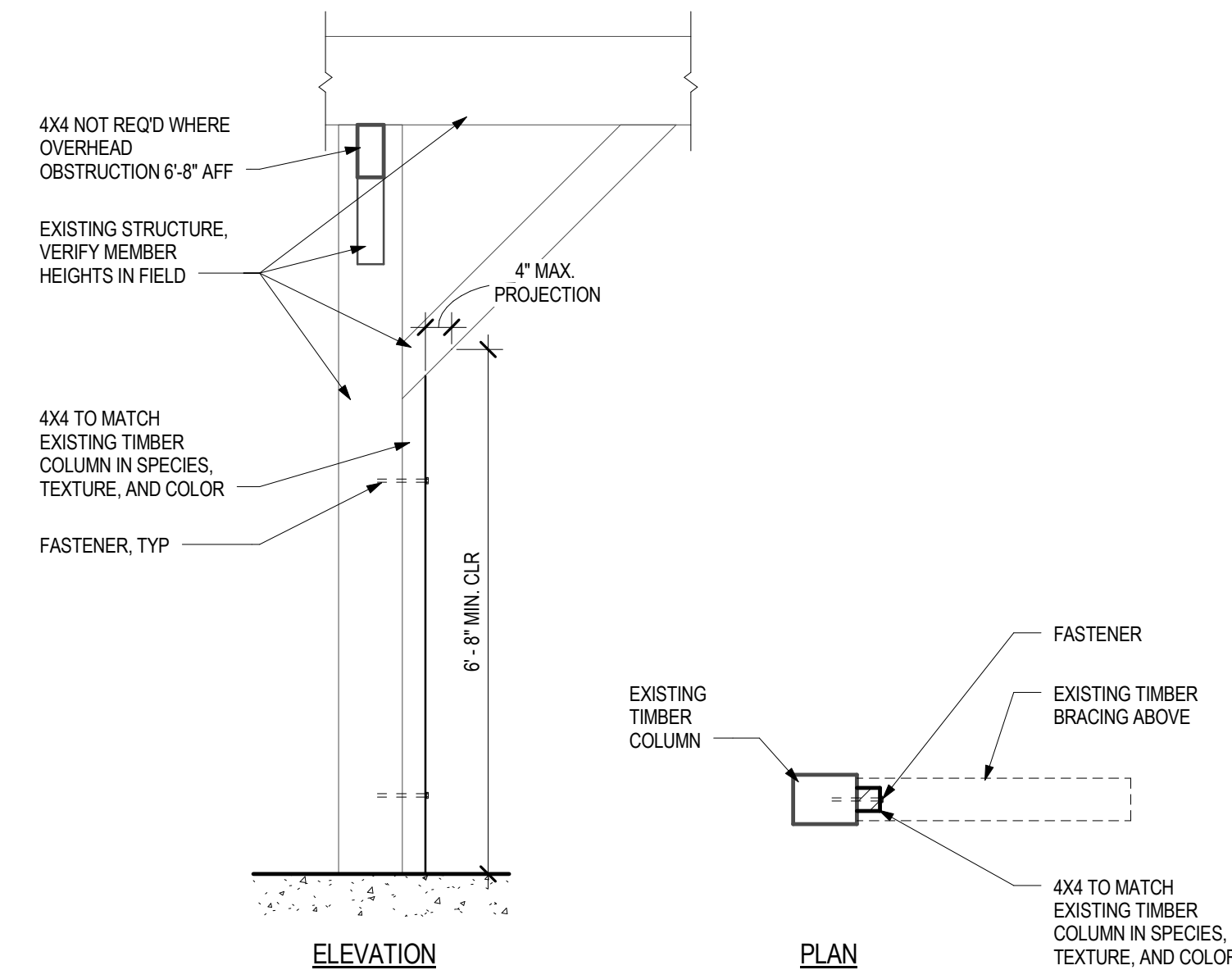
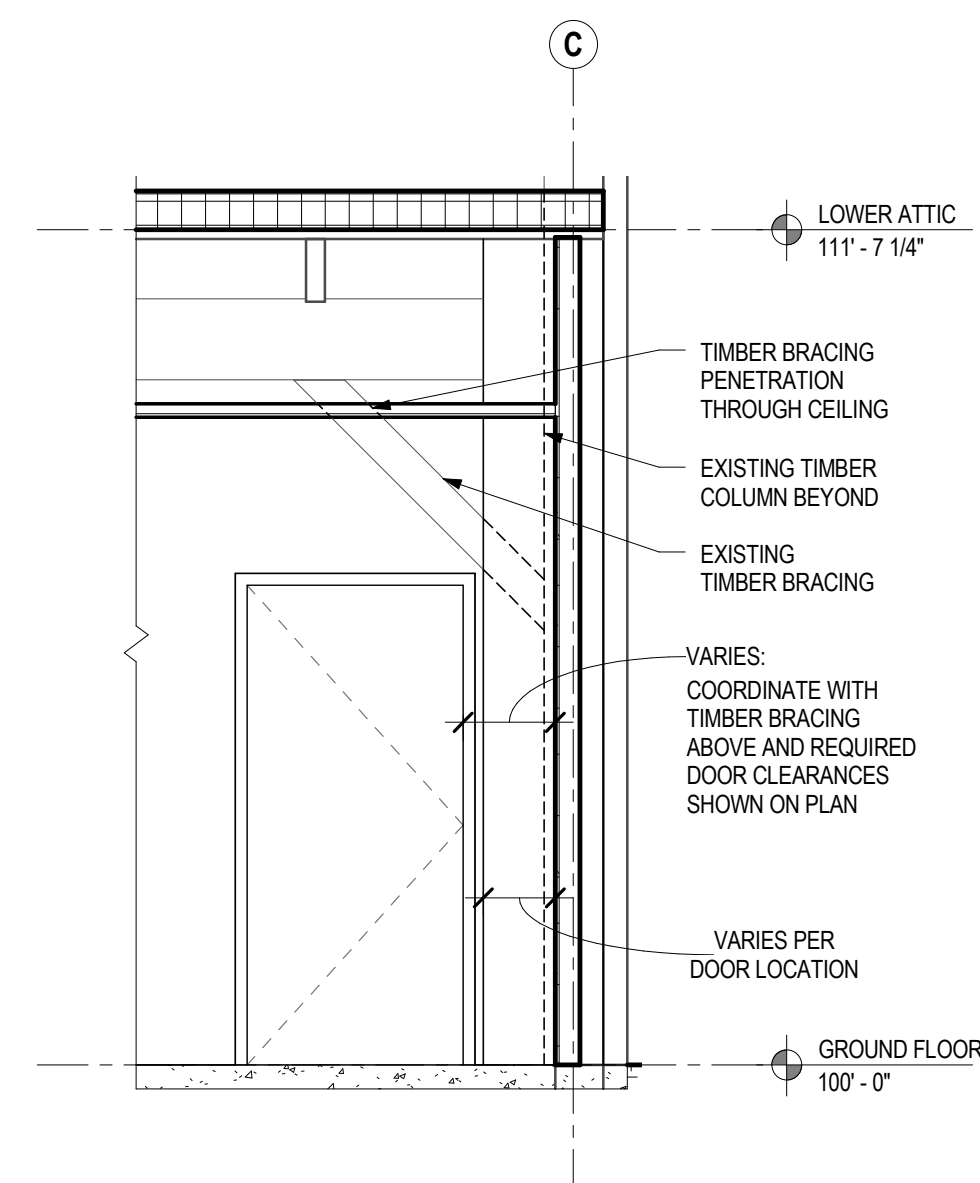
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**INTERIOR
ELEVATIONS**

A7.0

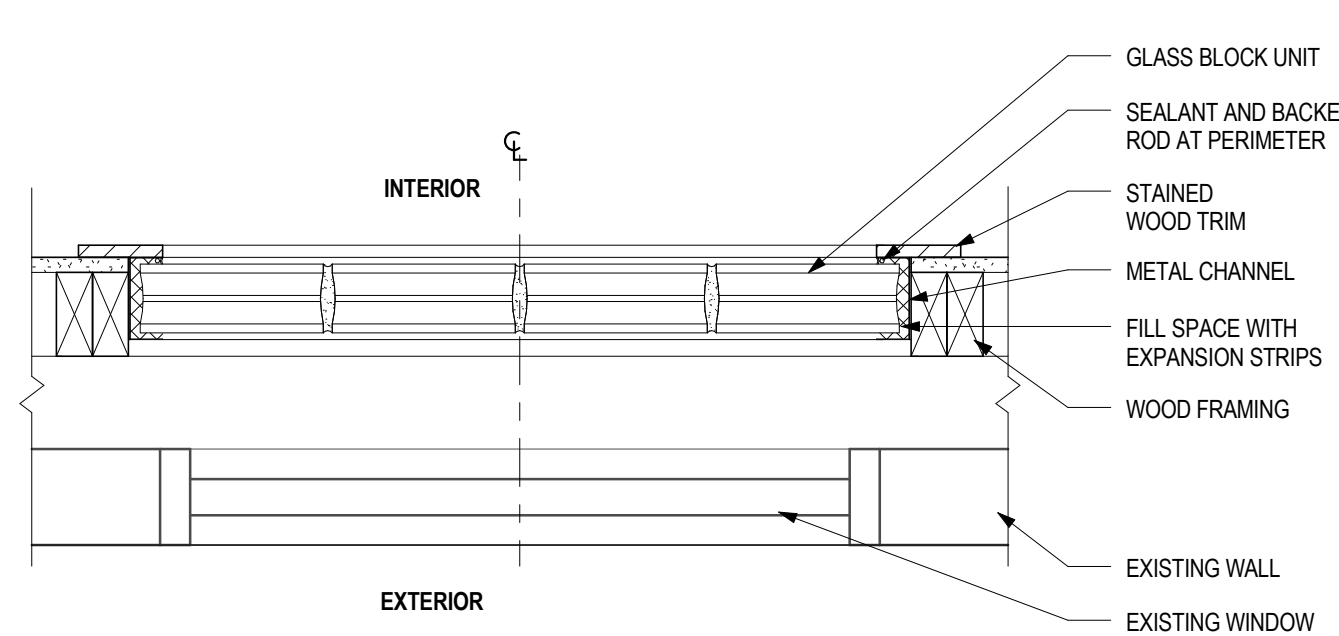
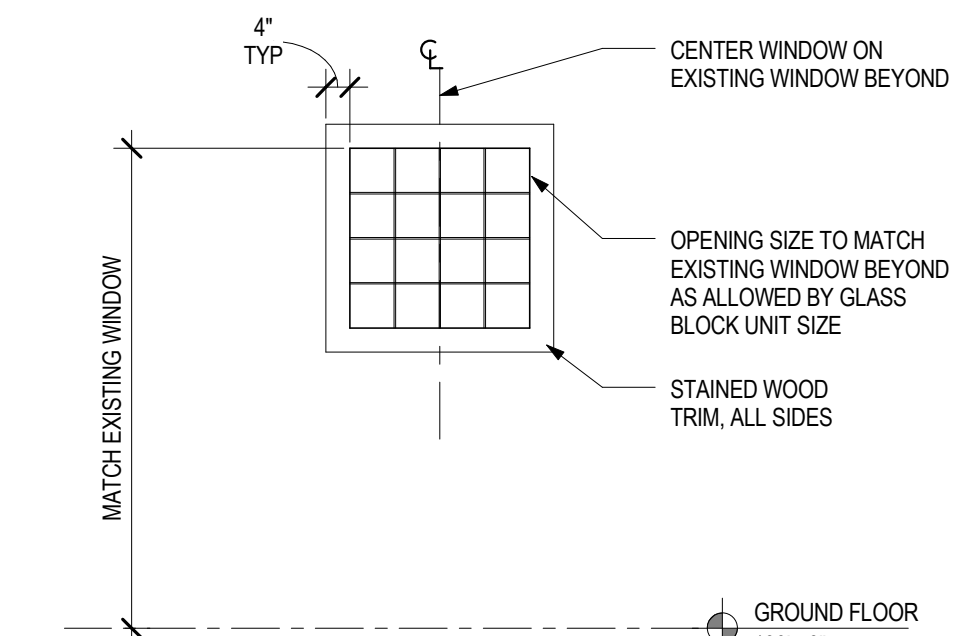


11 WOMEN'S RESTROOM ENTRY ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"

10 COLUMN BUILD-OUT DETAIL
1/2" = 1'-0" 0' 6" 1' 2'

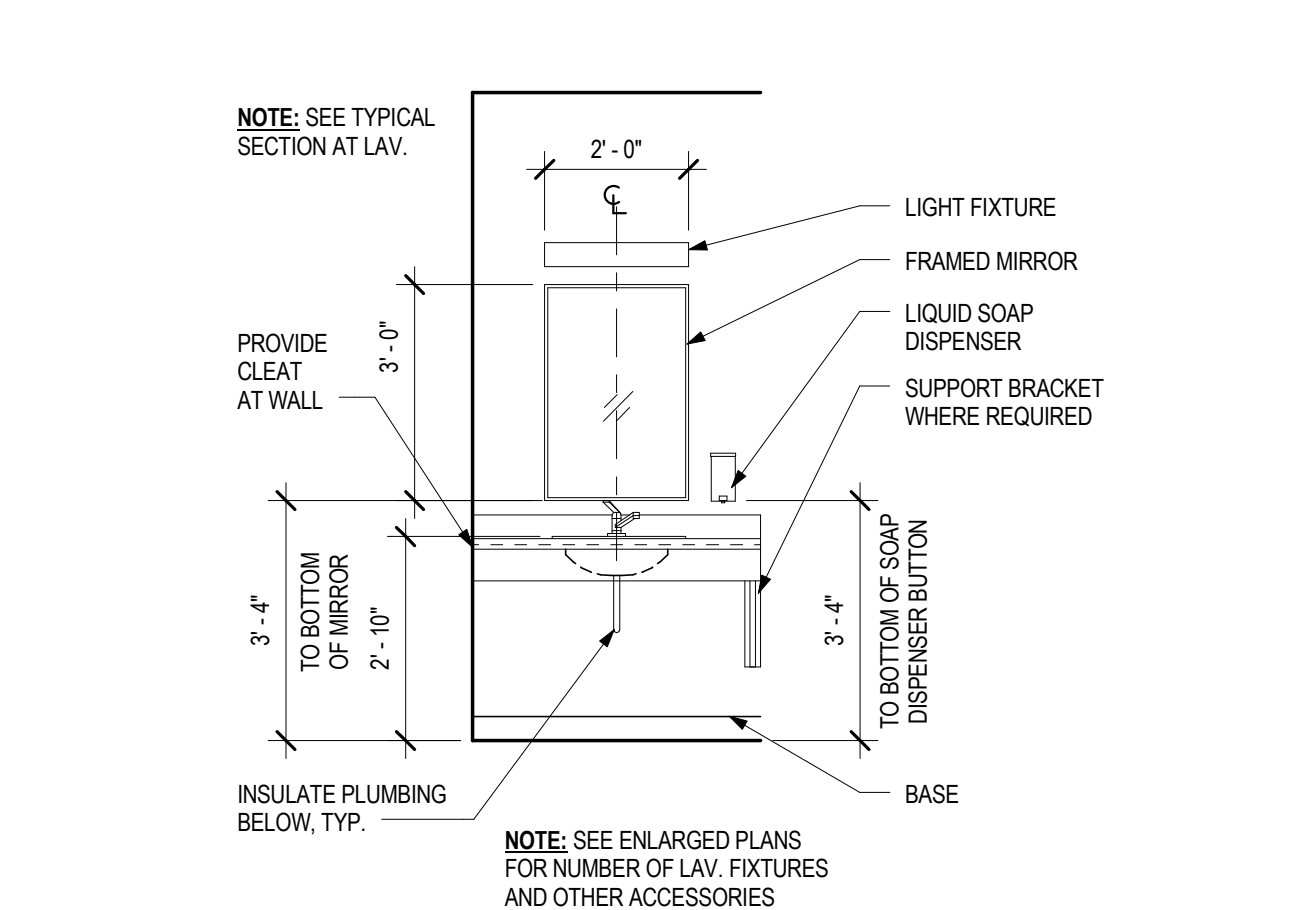
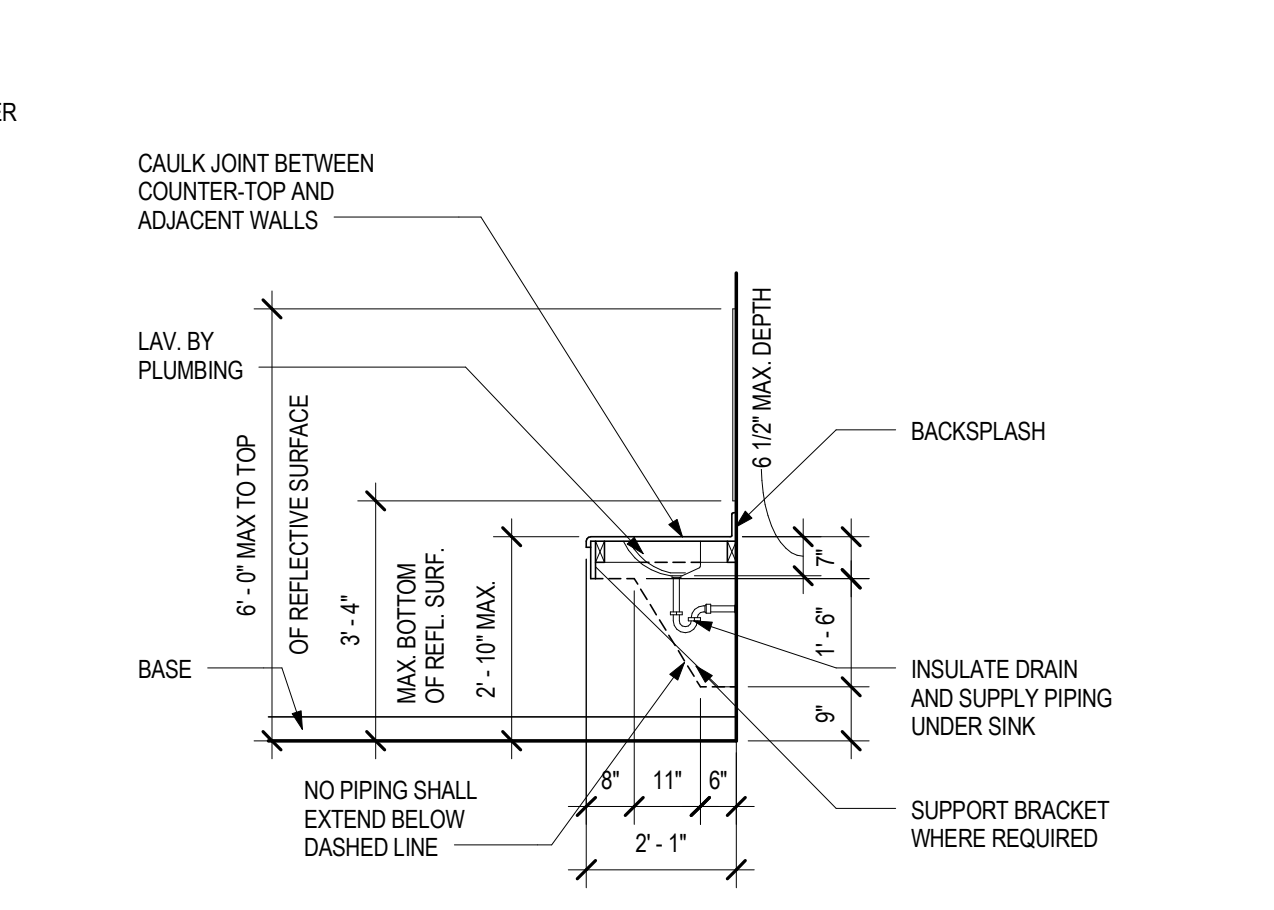
9 ACCESSIBLE PUBLIC URINAL FRONT ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"

8 TYPICAL FIRE EXTINGUISHER CABINET ELEVATION
1/2" = 1'-0" 0' 6" 1' 2'



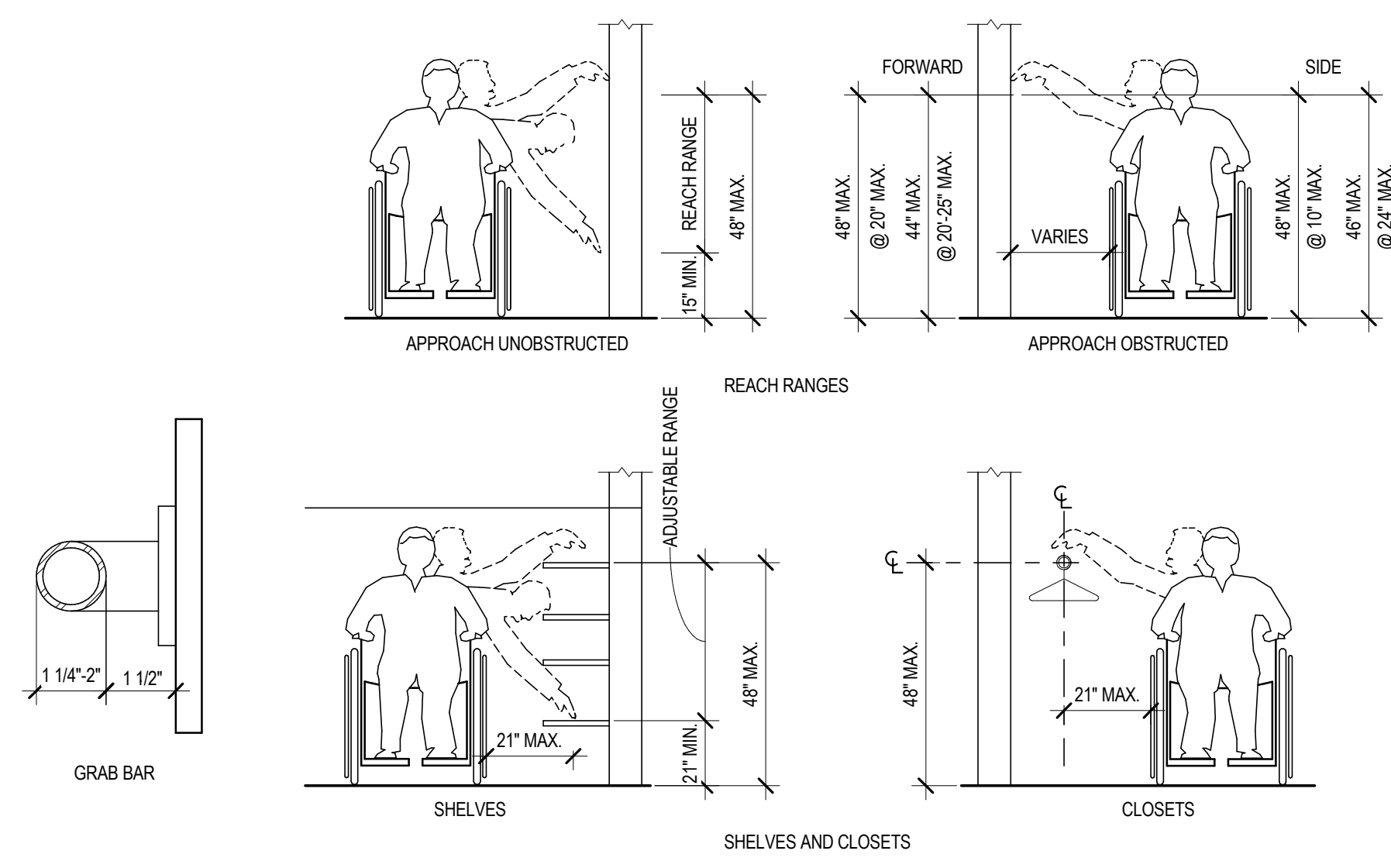
7 GLASS BLOCK WINDOW INTERIOR ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"

6 GLASS BLOCK WINDOW ENLARGED PLAN
1 1/2" = 1'-0" 0' 2" 4" 8"

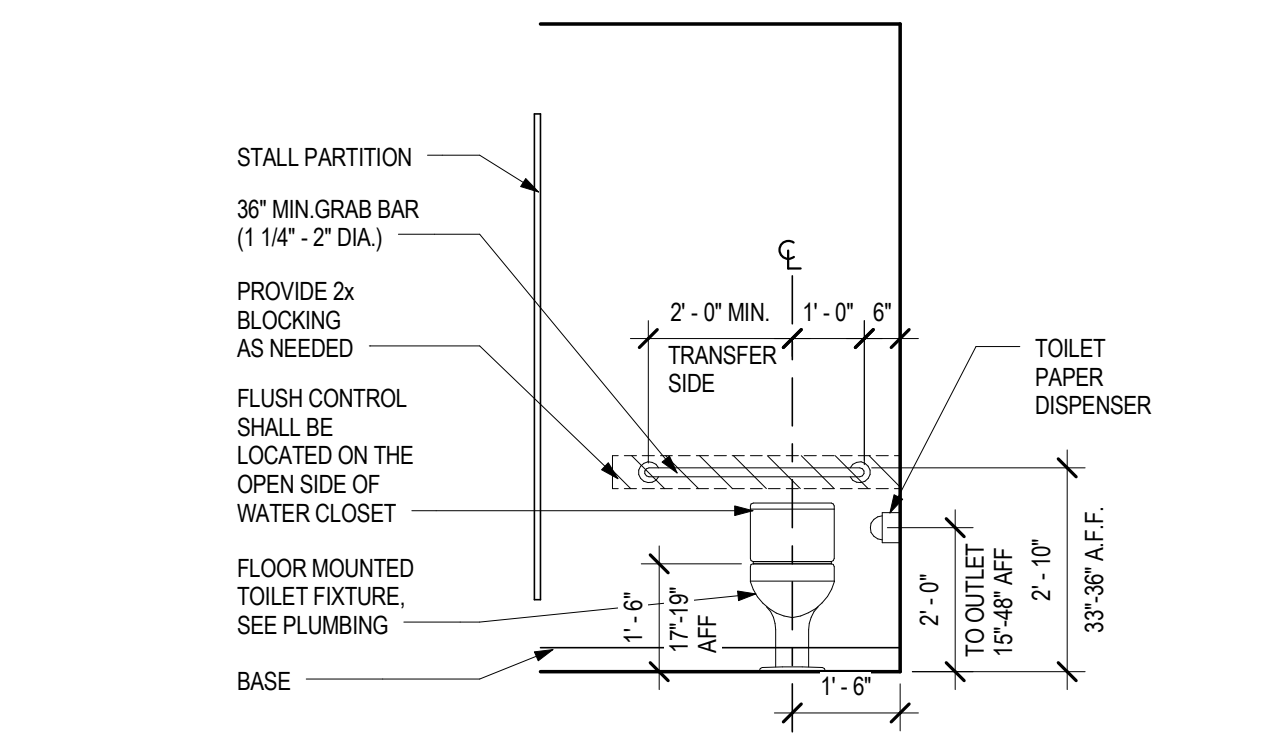


5 TYPICAL PUBLIC TOILET ROOM SINK & COUNTERTOP SECTION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"

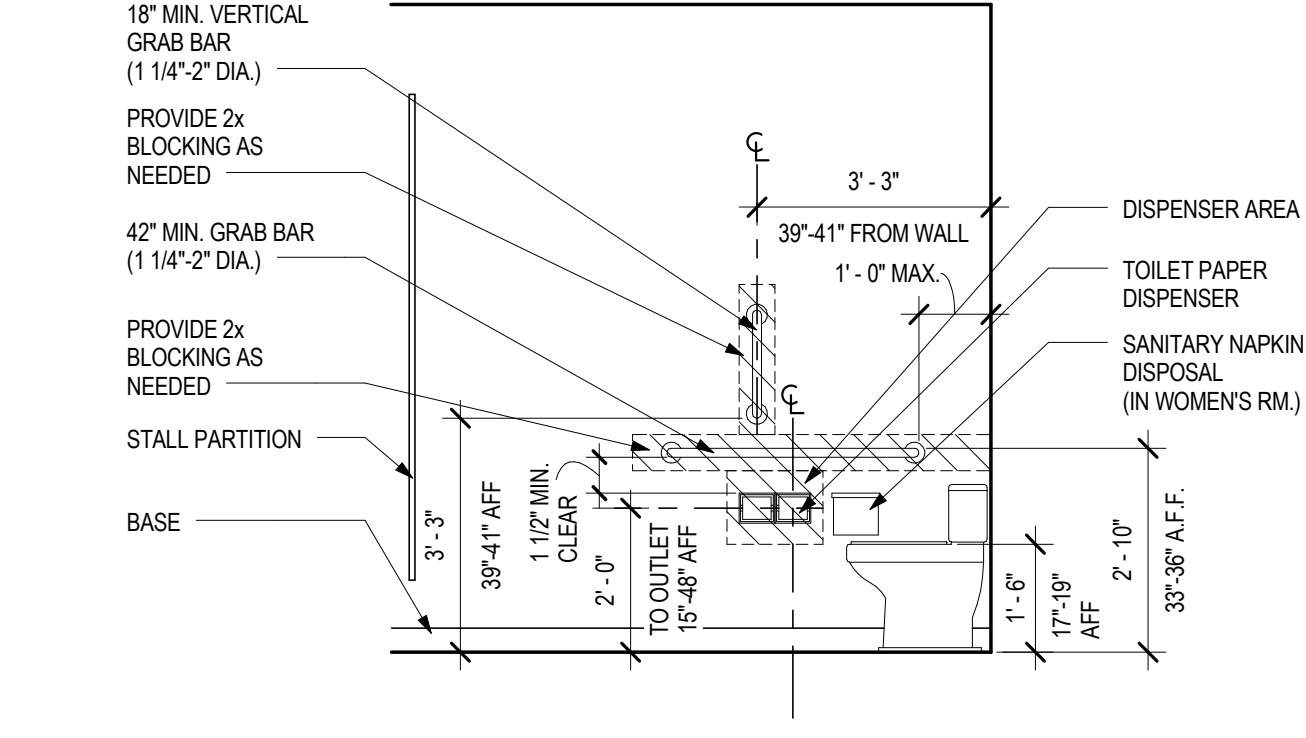
4 TYPICAL PUBLIC TOILETROOM SINKS & COUNTERTOP FRONT ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"



3 ACCESSIBILITY REACH DETAILS
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"



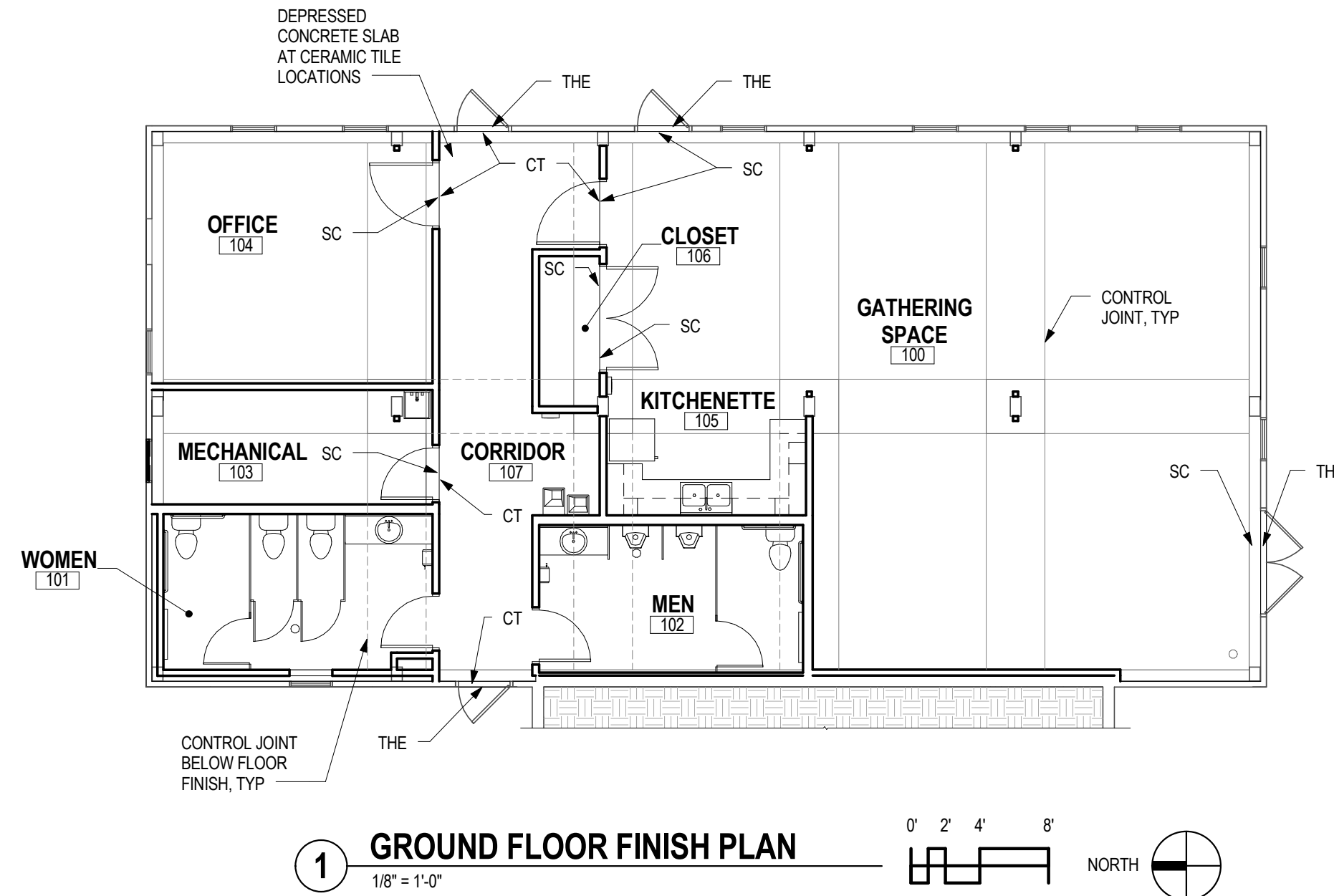
2 TYPICAL PUBLIC TOILET FRONT ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"



1 TYPICAL PUBLIC TOILET SIDE ELEVATION
3/8" = 1'-0" 0' 8" 1'-4" 2'-8"

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FINISH LEGEND	
ACT	ACOUSTICAL CEILING TILE
CC	COLORLED CONCRETE
CT	CERAMIC TILE
CTB	CERAMIC TILE BASE
GYP	GYPSUM BOARD
P	PAINT
PLUPLAM	PLASTIC LAMINATE
SC	SEALED CONCRETE
SSF	SOLID SURFACE
THE	THRESHOLD - EXTERIOR
THI	THRESHOLD - INTERIOR
TP	TOILET PARTITION
TR	TRANSITION STRIP
VB	VINYL BASE
WD	WOOD SIDING
WB	WOOD BASE

FLOOR FINISH GENERAL NOTES	
A.	PROVIDE TRANSITION STRIP BETWEEN DISSIMILAR FLOOR FINISHES.
B.	SEE DOOR SCHEDULE FOR DOOR FINISH INFORMATION.
C.	SEE A6.0 FOR EXTERIOR DOOR THRESHOLD INFORMATION.
D.	ALL COLOR SELECTIONS TO BE REVIEWED WITH OWNER FOR FINAL APPROVAL.
E.	WHERE EXISTING CONCRETE TO REMAIN EXPOSED, PREPARE TO RECEIVE NEW FINISH.

ROOM FINISH SCHEDULE													
Number	Location Name	Floor Finish		Wall Finish				Ceiling Finish		Cabinetry			Comments
		Field	Base	North	East	South	West	Soffit	Ceiling Material	Base	Countertop	Upper	
GROUND FLOOR													
100	GATHERING SPACE	SC-1 (BASE), CC-1 (ALT)	WB-1	P-1 (WD-1 BY OWNER)	(WD-1 BY OWNER)	(WD-1 BY OWNER)	P-1 (WD-1 BY OWNER)	---	EXIST.	-	-	-	1
101	WOMEN	CT-1	CTB-1	FRP-1	FRP-1	FRP-1	FRP-1	-	ACT-1	-	SSF-1	-	6
102	MEN	CT-1	CTB-1	FRP-1	FRP-1	FRP-1	FRP-1	-	ACT-1	-	SSF-1	-	6
103	MECHANICAL	SC-1	-	P-1	P-1	P-1	P-1	-	EXIST.	-	-	-	1
104	OFFICE	SC-1	WB-1	P-1 (WD-2 BY OWNER)	(WD-2 BY OWNER)	P-1	P-1	-	EXIST.	-	-	-	1
105	KITCHENETTE	SC-1 (BASE), CC-1 (ALT)	WB-1	P-1	-	P-1	P-1	-	EXIST.	CAB-1	PL-1	CAB-1	1, 2, 4
106	CLOSET	SC-1	VB-1	P-1	P-1	P-1	P-1	-	EXIST.	-	-	-	1
107	CORRIDOR	CT-1	CTB-1	P-1	EXIST.	P-1	EXIST.	-	WOOD, EXIST.	-	-	-	1, 7

ROOM FINISH SCHEDULE COMMENTS	
1	WALLS TO BE TAPED, FINISHED, TEXTURED, AND PAINTED BY GENERAL CONTRACTOR.
2	TILE BACKSPLASH BY OWNER.
3	NOT USED
4	CABINET, COUNTERTOP, AND APPLIANCES BY OWNER.
5	NOT USED
6	INSTALL ACT-1 AS HIGH AS POSSIBLE IN ROOM, COORDINATE WITH ARCHITECT IF LESS THAN 9'-0".
7	TONGUE & GROOVE WOOD DECKING TO MATCH EXISTING.

FINISH LIST		
ITEM: ACT-1 MANUFACTURER: ARMSTRONG OR EQUAL NUMBER: COLOR: WHITE DESCRIPTION: 2X2 VINYL COATED TILE NOTES: 15/16" GRID	ITEM: CC-1 MANUFACTURER: BUTTERFIELD NUMBER: U34 COLOR: BRICK RED DESCRIPTION: ALTERNATE BID NOTES: FINAL APPROVAL OF COLOR BY OWNER	ITEM: CT-1 MANUFACTURER: DAL TILE NUMBER: COLOR: COFFEE P404 DESCRIPTION: 12X12 PORCELAIN FIELD TILE NOTES: FINAL APPROVAL OF TILE & GROUT COLOR BY OWNER GROUT: BOSTIK TIMBER H199
ITEM: CTB-1 MANUFACTURER: DAL TILE NUMBER: S-36C9T COLOR: COFFEE P404 DESCRIPTION: 6X12 PORCELAIN COVE BASE NOTES: FINAL APPROVAL OF TILE & GROUT COLOR BY OWNER GROUT: BOSTIK TIMBER H199	ITEM: FRP-1 MANUFACTURER: MARLITE NUMBER: P440N COLOR: BISCUIT DESCRIPTION: WALL PANELS FLOOR TO CEILING NOTES: FINAL APPROVAL OF COLOR BY OWNER	ITEM: P-1 MANUFACTURER: SHERWIN WILLIAMS NUMBER: SW 9111 COLOR: ANTLER VELVET DESCRIPTION: NOTES: FINAL APPROVAL OF COLOR BY OWNER
ITEM: SC-1 MANUFACTURER: NUMBER: COLOR: CLEAR, SEALED NATURAL CONCRETE DESCRIPTION: BASE BID NOTES:	ITEM: PL-1A MANUFACTURER: WILSONART NUMBER: 4883-38 COLOR: SABLE SOAPSTONE DESCRIPTION: SUGGESTED DARK PLAM OPTION NOTES: FINAL SELECTION BY OWNER	ITEM: PL-1B MANUFACTURER: WILSONART NUMBER: 4946-38 COLOR: NATURAL COTTON DESCRIPTION: SUGGESTED LIGHT PLAM OPTION NOTES: FINAL SELECTION BY OWNER
ITEM: WD-1 MANUFACTURER: NUMBER: COLOR: KNOTTY PINE - 3/4" THICK W/ CLEAR FINISH DESCRIPTION: NOTES: BY OWNER	ITEM: SSF-1 MANUFACTURER: WILSONART NUMBER: 9202CS COLOR: SEA STONE DESCRIPTION: COUNTER WITH INTEGRAL BOWL NOTES: FINAL APPROVAL OF COLOR BY OWNER	ITEM: WB-1 MANUFACTURER: NUMBER: COLOR: BIRCH BASE, STAIN W/CLR POLY FINISH DESCRIPTION: 3/4" X 6" WOOD BASE NOTES:
ITEM: TP-1 MANUFACTURER: ACCURATE NUMBER: 836 COLOR: SAND DESCRIPTION: METAL POWDER-COATED TOILET PARTITIONS NOTES: FINAL APPROVAL OF COLOR BY OWNER	ITEM: WD-2 MANUFACTURER: NUMBER: COLOR: DESCRIPTION: RED PINE, 3/4" THICK W/CLEAR FINISH NOTES: BY OWNER	ITEM: VB-1 MANUFACTURER: JOHNSONITE NUMBER: 283 COLOR: TOAST DESCRIPTION: 4" VINYL COVE BASE NOTES:

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**FLOOR FINISH
PLAN**

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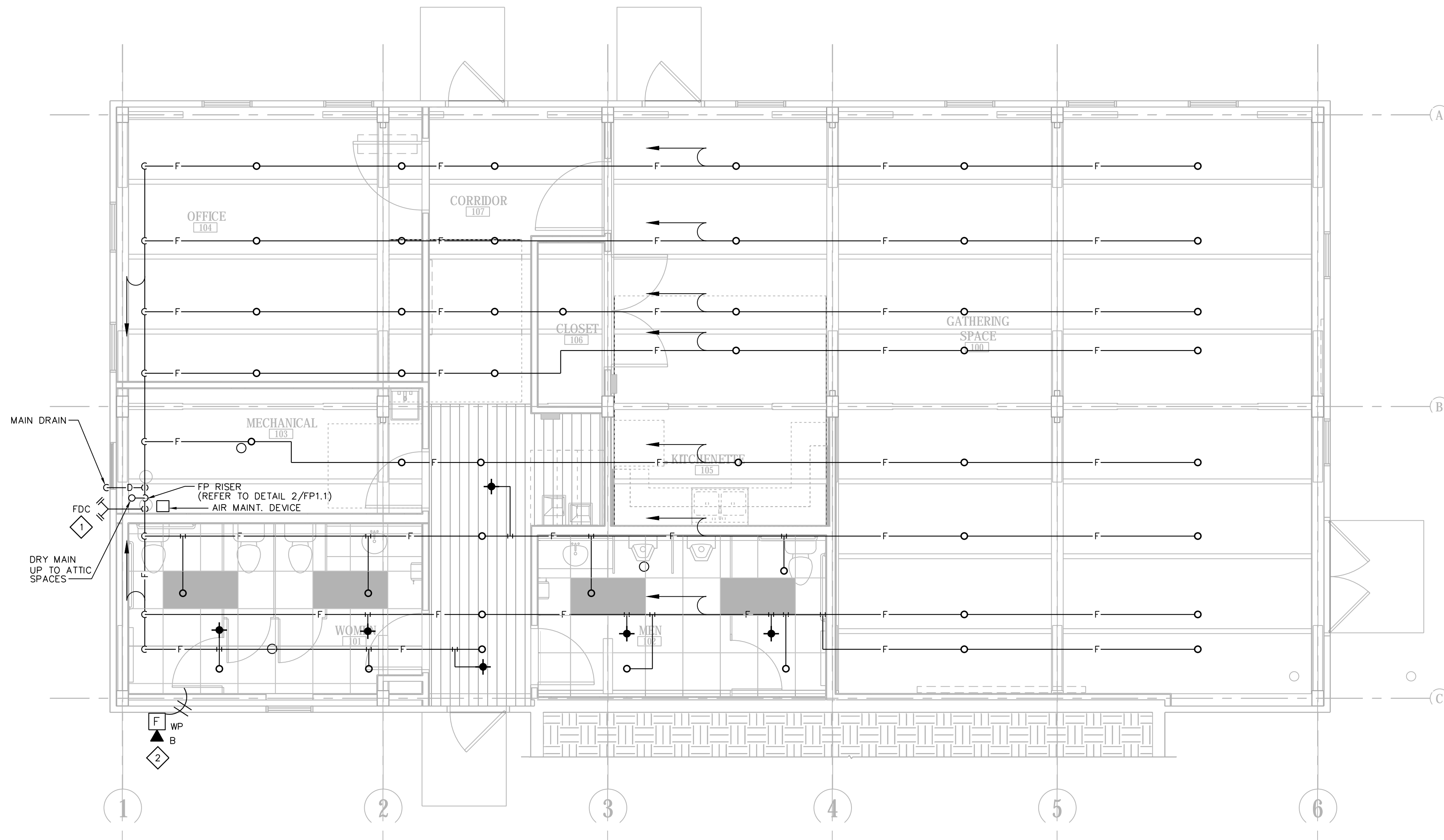
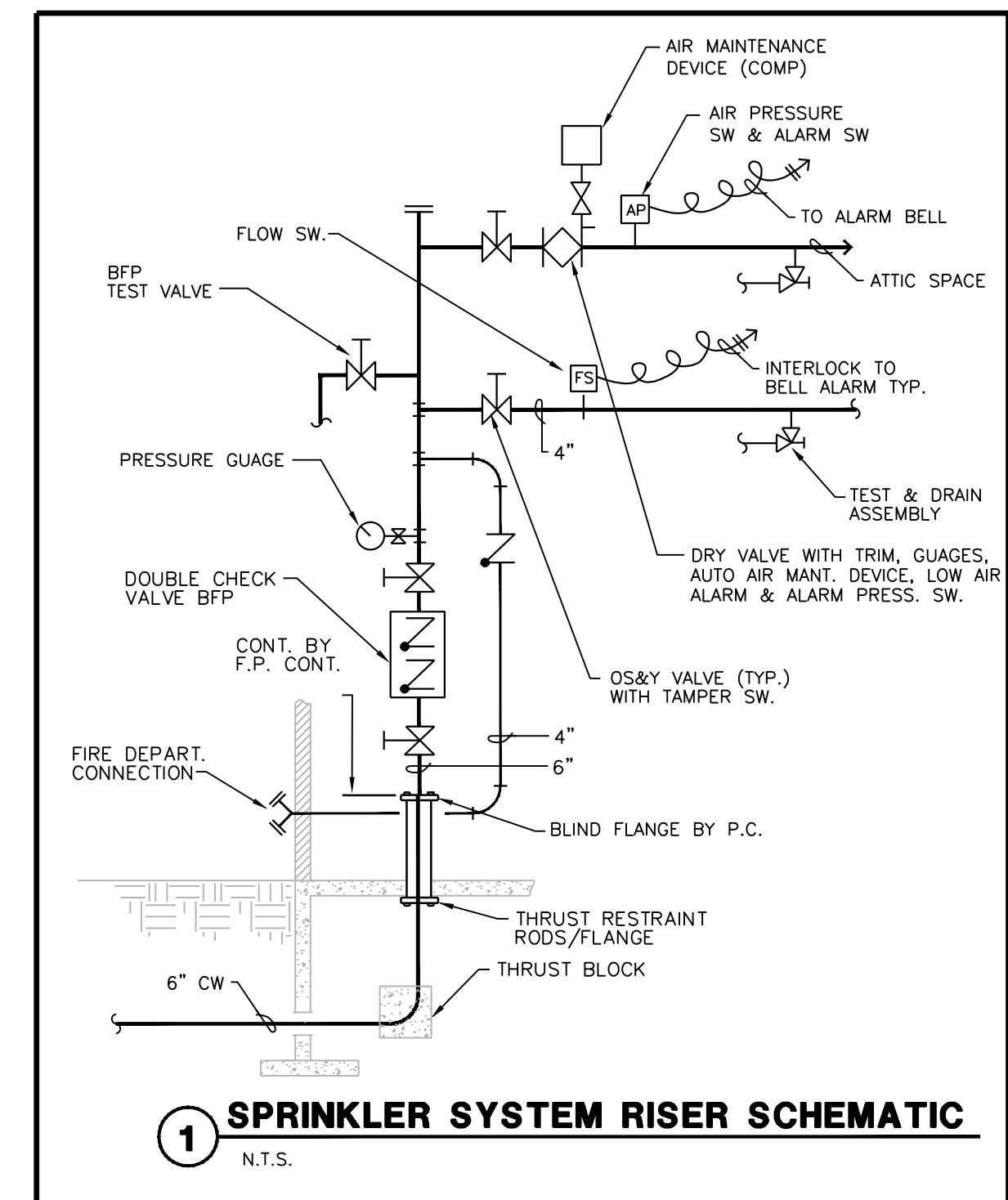
FIRE PROTECTION NOTES:

1. THESE DRAWINGS ARE PROVIDED FOR DESIGN INTENT ONLY, IN CONJUNCTION WITH THE PERFORMANCE SPECIFICATIONS.
2. LOCATE ALL HEADS IN ACOUSTIC TILE CEILINGS CENTERED IN TILES.
3. FIRE PROTECTION CONTRACTOR SHALL DESIGN AND PROVIDE A COMPLETE HYDRAULICALLY CALCULATED COMBINATION WET SPRINKLER SYSTEM. COORDINATE DESIGN WITH OTHER TRADES AND GENERAL CONTRACTOR.
4. THE SPRINKLER DESIGN SHALL MEET REQUIREMENTS OF NFPA 13 AND LOCAL FIRE MARSHAL/INSPECTOR FOR APPROVAL.
5. DESIGN BASIS GENERAL SPACE: LIGHT HAZARD VERIFY FINAL DESIGN CONDITIONS WITH LOCAL FIRE MARSHAL PRIOR TO SUBMITTING BID.
6. SPRINKLER HEADS: QUICK RESPONSE TYPE.
7. PROVIDE SUPERVISED VALVES & FLOW SWITCHES FOR EACH RISER (WITH AUXILIARY CONTACTS FOR FIRE ALARM SUPERVISION).
8. PROVIDE FORWARD FLOW TEST CONNECTION FOR DOUBLE CHECK VALVE BACKFLOW PREVENTER.
9. PROVIDE INSPECTOR'S TEST CONNECTION FOR TEST AND DRAIN OF WET SPRINKLER SYSTEM.
10. PROVIDE LABELED AUXILIARY DRAINS AT ALL TRAPPED PIPING AND LOW POINTS.
11. PROVIDE SPARE HEAD CABINET AND SPRINKLER WRENCH AT FP RISER.
12. PROVIDE BALL DRIP VALVE AT FIRE DEPARTMENT CONNECTION PIPING.
13. ARRANGE WIRING OF FIRE PROTECTION ALARM BELL WITH ELECTRICAL CONTRACTOR.

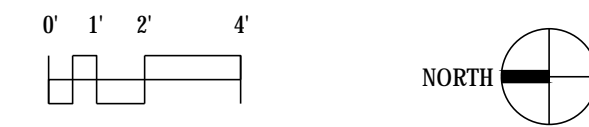
FIRE PROTECTION PLAN NOTES:

- ① FIRE DEPARTMENT CONNECTION (FDC) FOR FIRE PROTECTION SYSTEM.
- ② FIRE PROTECTION AUDIO/VISUAL ALARM DEVICE PROVIDED BY F.P.C. WIRED BY E.C.

FIRE PROTECTION SYMBOL SCHEDULE	
SYMBOL	DESCRIPTION
○	UPRIGHT SPRINKLER
⊕	CEILING SEMI-RECESSED SPRINKLER
⊖	CEILING RECESSED CONCEALED SPRINKLER
⊔	SIDEWALL SPRINKLER
⊔ _D	SIDEWALL SPRINKLER - DRY HEAD
— F —	WET SUPPLY PIPING
— D —	DRY SUPPLY PIPING
WP ▶	FP SPRINKLER ALARM STROBE/HORN - WEATHERPROOF
FDC ⊕	FDC FIRE DEPT CONNECTION



① GROUND FLOOR PLAN - FIRE PROTECTION
1/4" = 1'-0"



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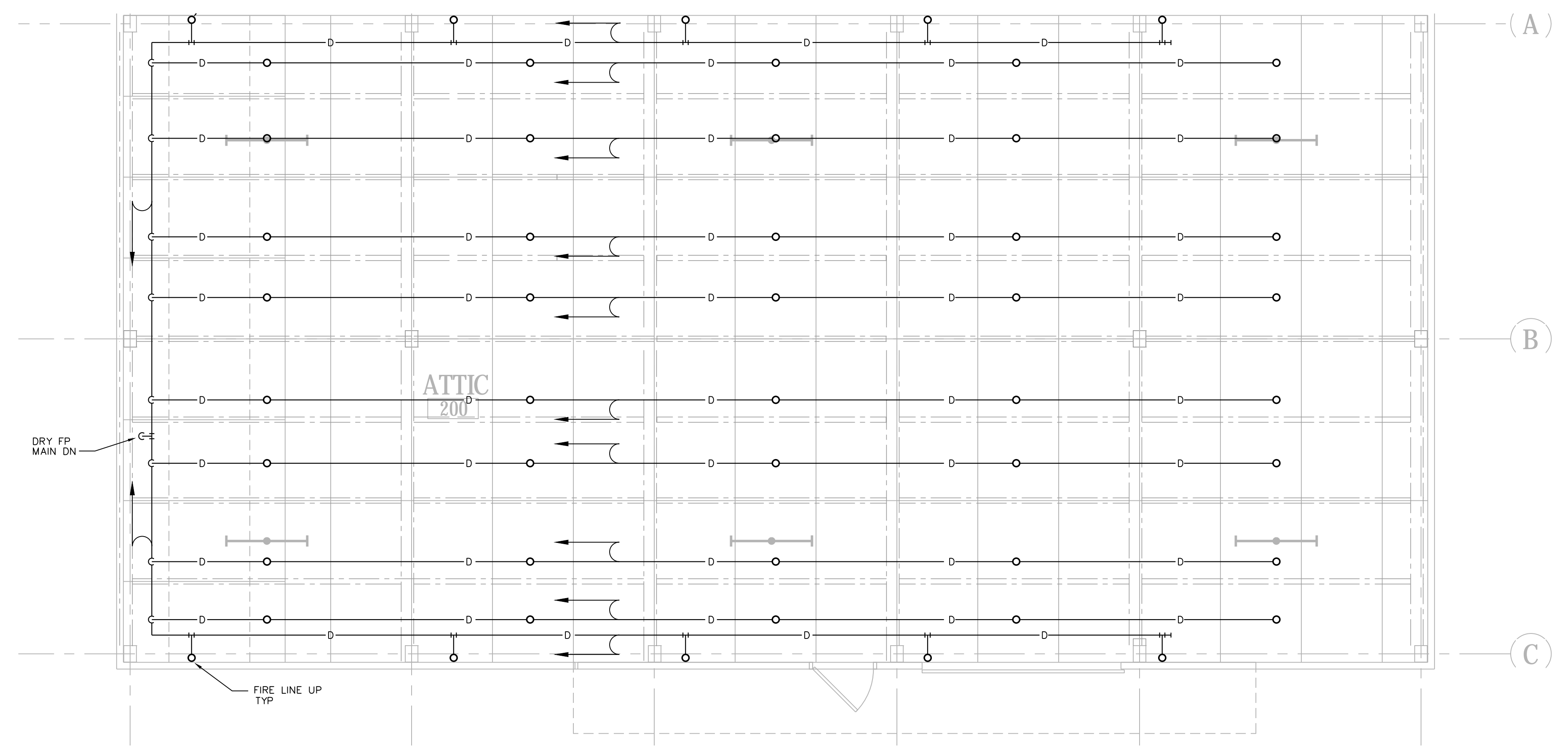
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**GROUND
FLOOR PLAN -
FIRE PROTECTION**

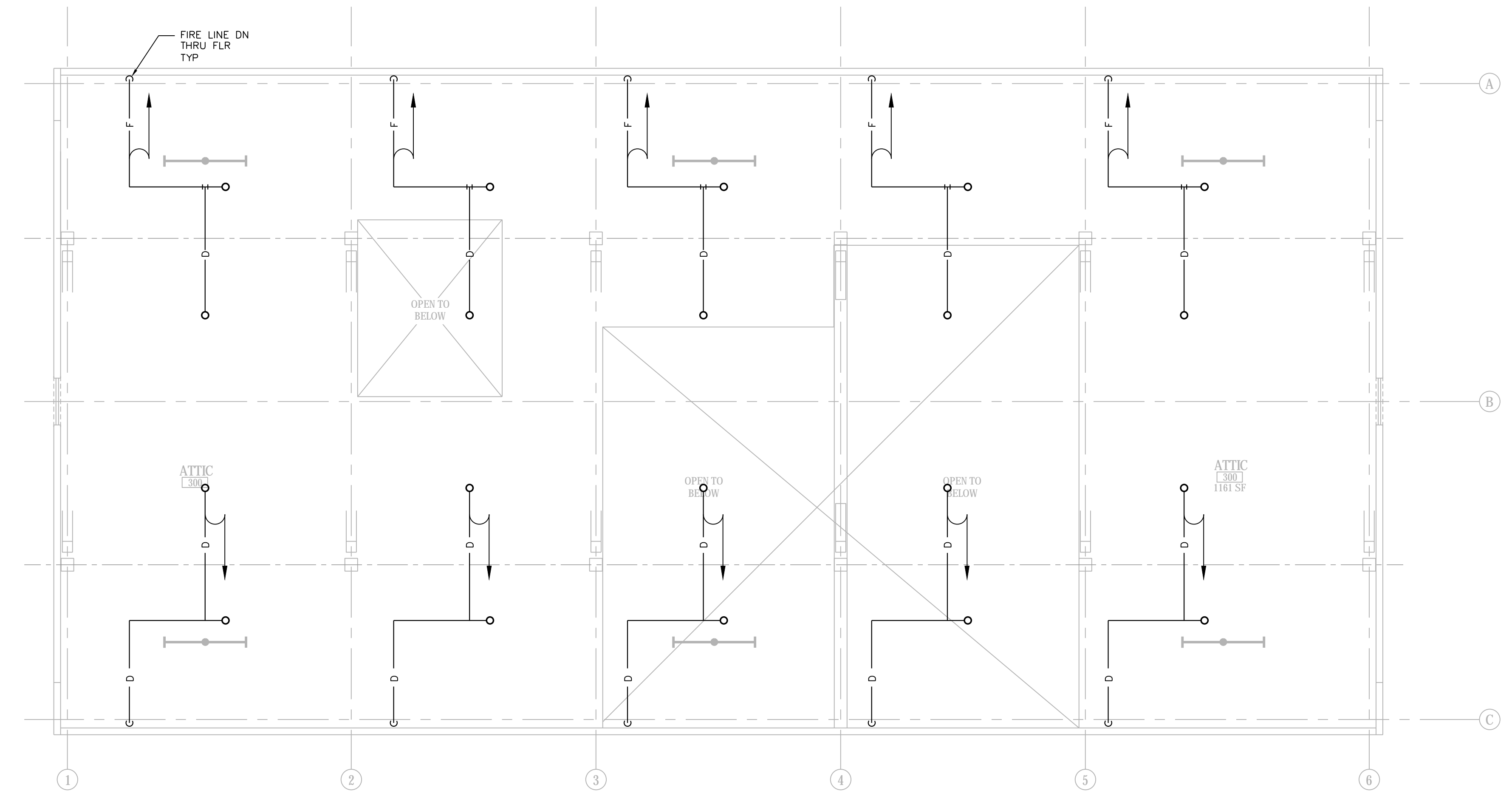
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① LOWER ATTIC PLAN - FIRE PROTECTION
 1/4" = 1'-0" 0' 1' 2' 4' NORTH



① UPPER ATTIC PLAN - FIRE PROTECTION
 1/4" = 1'-0" 0' 1' 2' 4' NORTH

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REVISIONS:

PROJECT # 14099

**ATTIC FLOOR PLANS -
 FIRE PROTECTION**

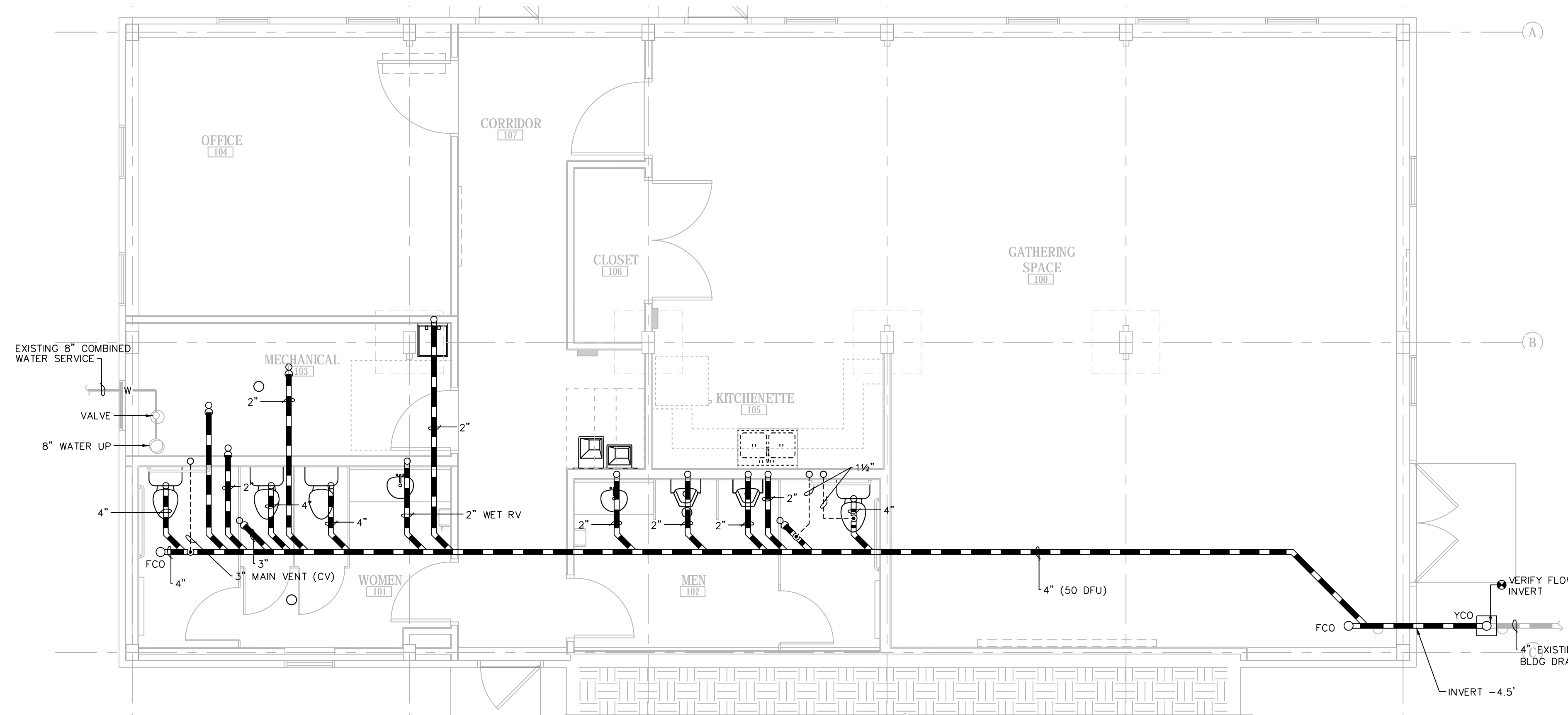
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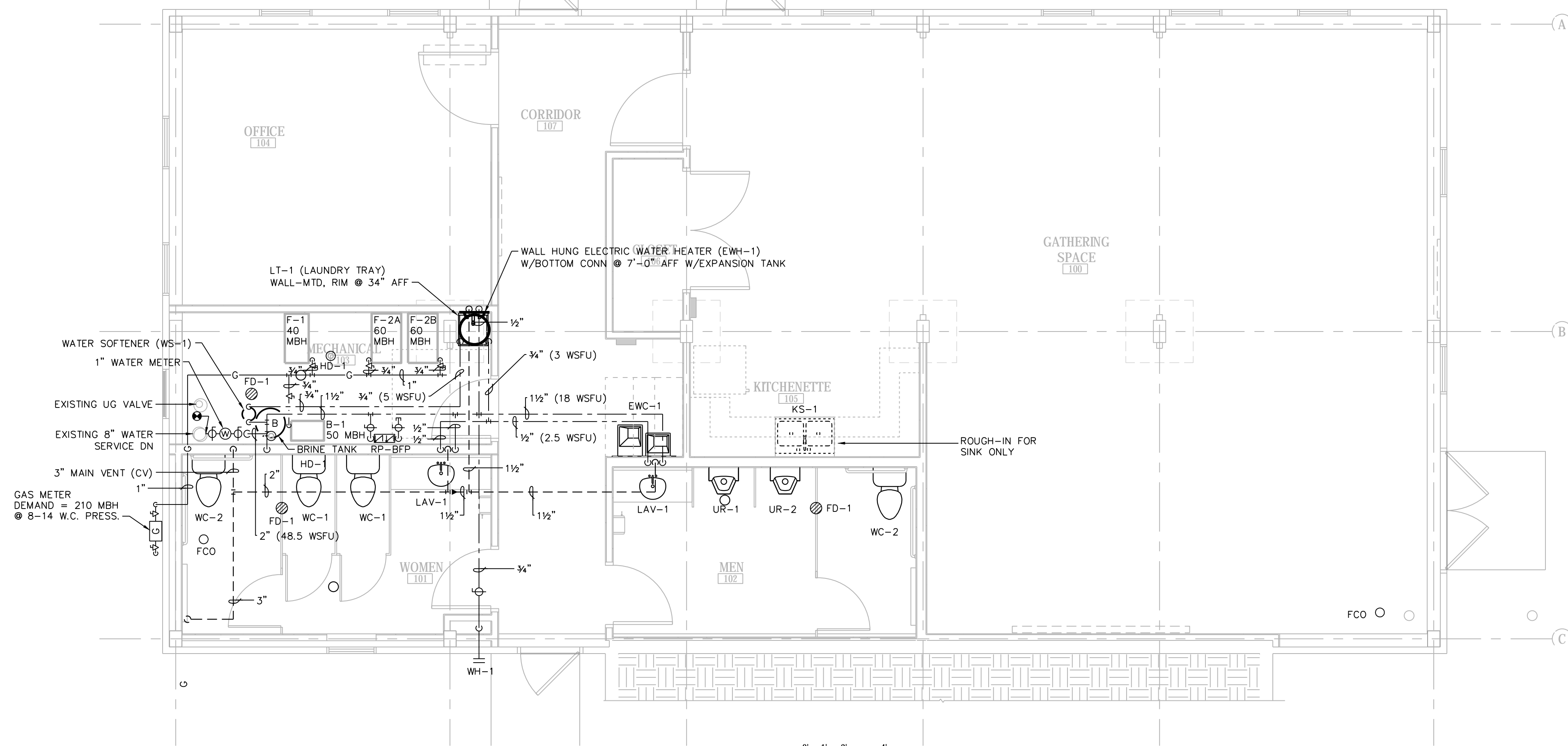
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PLUMBING GENERAL NOTES:

1. PLUMBING CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS.
2. COORDINATE PIPING ROUTING WITH OTHER TRADES TO MAINTAIN SCHEDULED CEILING HEIGHTS.
3. COORDINATE FLOOR DRAINS & FLOOR MTD. FIXTURE LOCATIONS & MOUNTING HEIGHTS WITH THE GENERAL CONTRACTOR & THE CONCRETE FLOOR POUR.
4. REFER TO WATER, WASTE & VENT RISERS FOR PIPE SIZES AND LOCATIONS.



1 FLOOR PLAN - UNDERGROUND PLUMBING
1/4" = 1'-0" NORTH



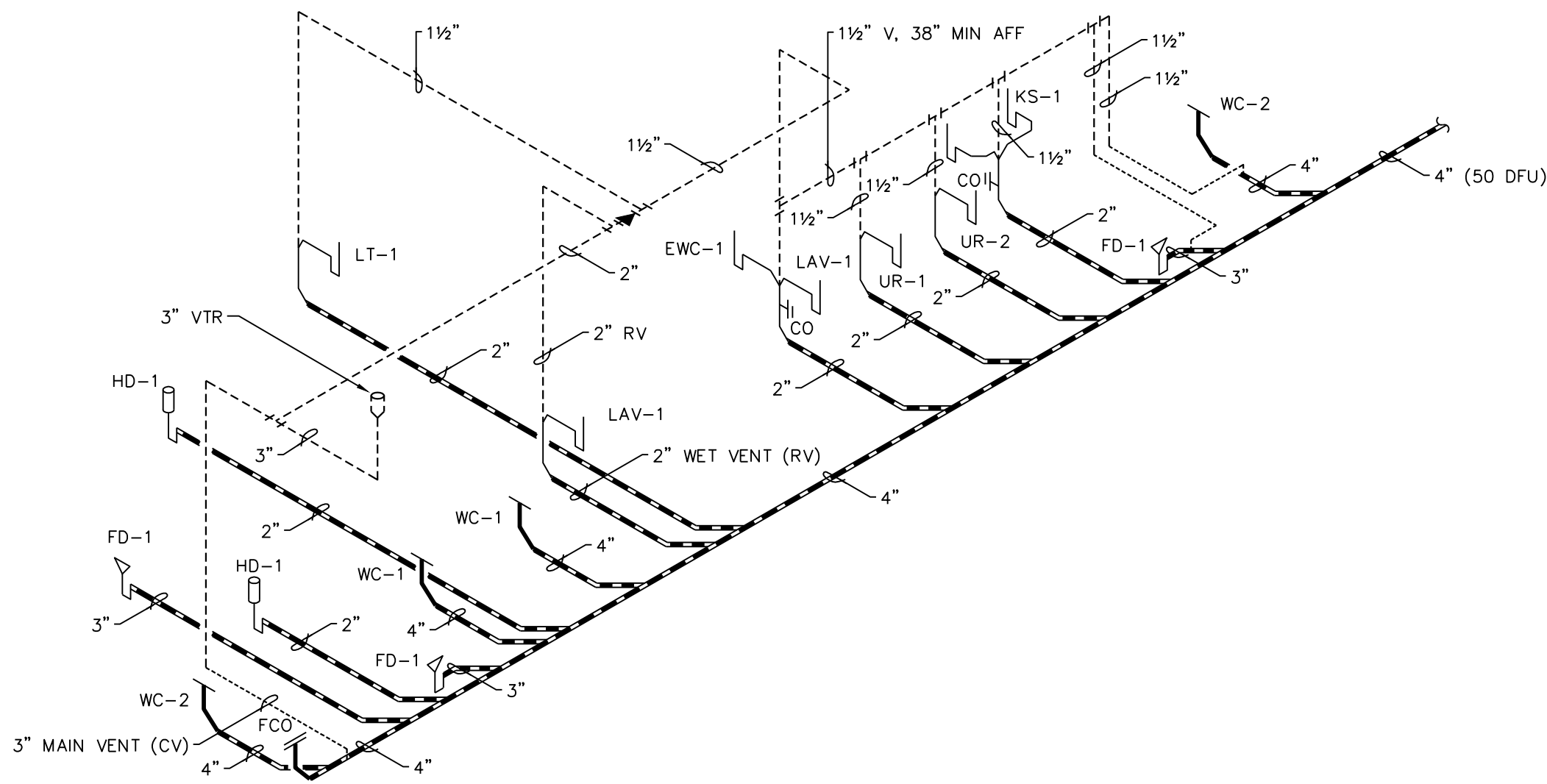
2 FLOOR PLAN - PLUMBING
1/4" = 1'-0" NORTH

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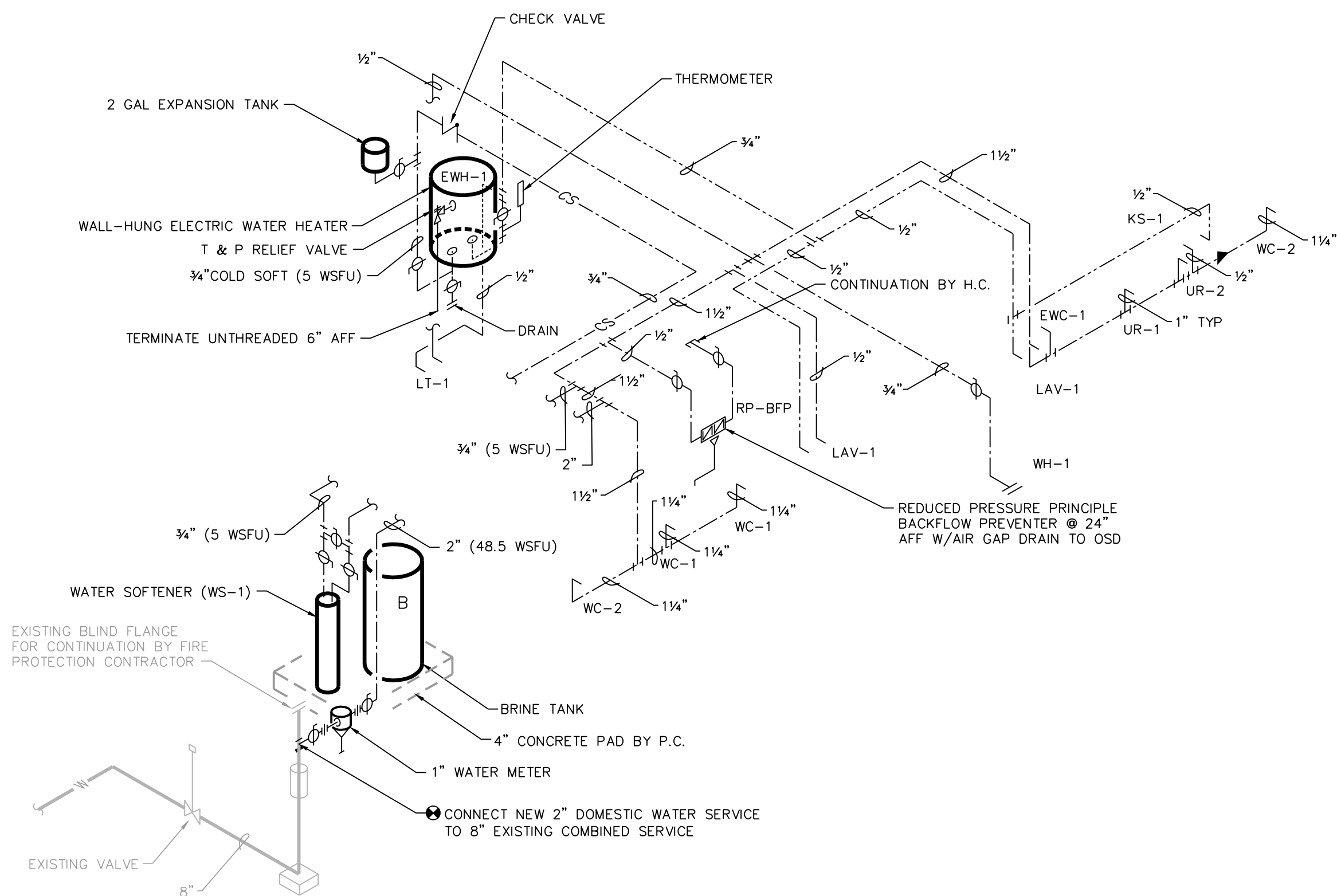
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**FLOOR PLANS -
PLUMBING**



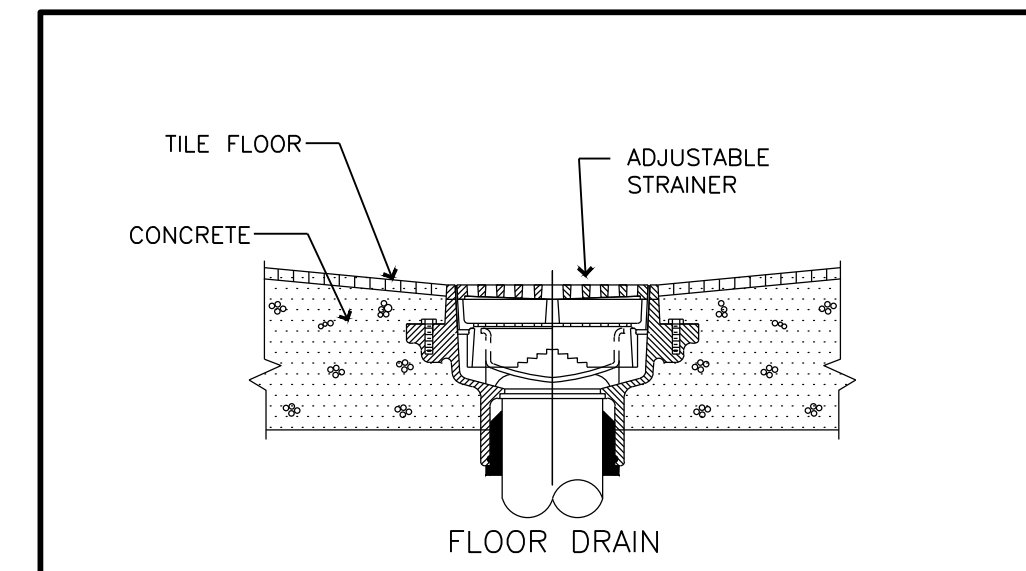
1 WASTE & VENT RISER
SCALE: NONE



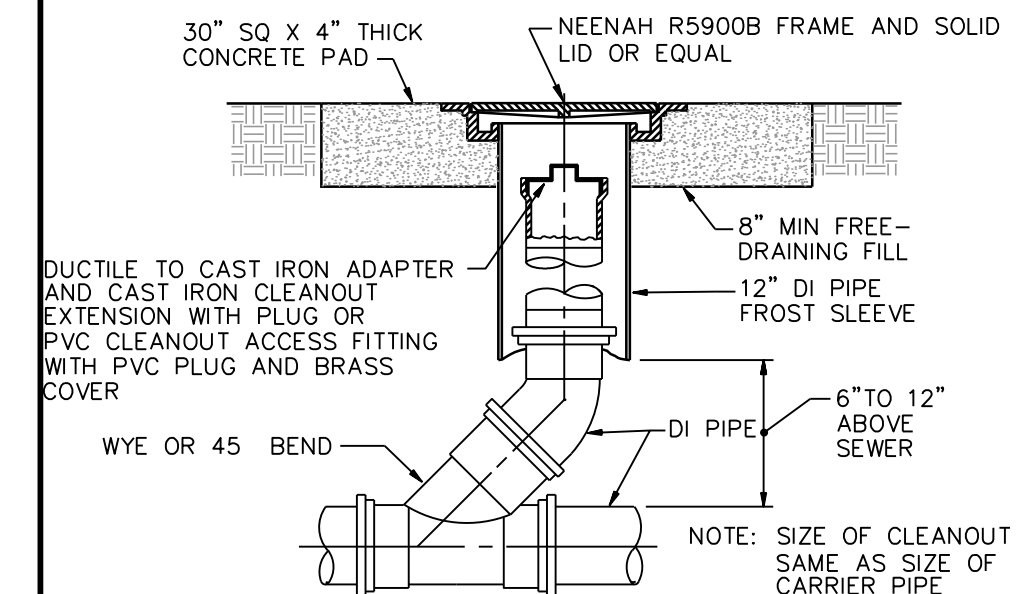
2 WATER PIPING RISER
SCALE: NONE

PLUMBING FIXTURE SCHEDULE						
P#	FIXTURE	WASTE	VENT	CW.	HW.	DESCRIPTION
WC-1	WATER CLOSET	4"	1-1/2"	1"	--	VITREOUS CHINA, WHITE, FLOOR-MTD. ELONGATED BOWL, 1-1/2" TOP SPUD, RIM @ 16-1/2" AFF FIXTURE EQUAL TO KOHLER HIGHREST K-4302, SLOAN OPTIMA 8111 BATTERY-POWERED, SENSOR-OPERATED FLUSH VALVE (1.6 GPF) & BEMIS 1955-SSC OPEN FRONT SEAT.
WC-2	WATER CLOSET	4"	1-1/2"	1"	--	SAME AS WC-1, ADA COMPLIANT.
UR-1	URINAL	2"	1-1/2"	3/4"	--	VITREOUS CHINA, WHITE, WALL-HUNG, TOP SPUD, RIM MTD. 24" AFF. KOHLER BARDON MODEL K-4904-ET WITH SLOAN 8186-1.0 BATTERY-POWERED, SENSOR-OPERATED FLUSH VALVE (1.0 GPF), K-9183 S.S. BEEHIVE STRAINER. PROVIDE VERTICAL ADJUSTABLE WALL CARRIER.
UR-2	URINAL	2"	1-1/2"	3/4"	--	SAME AS UR-1 EXCEPT RIM MTD @ 17" ADA COMPLIANT.
LAV-1	LAVATORY	1-1/4"	1-1/2"	1/2"	1/2"	INTEGRAL BOWL COUNTERTOP, (2-HOLE 4" O.C.) W/SLOAN EBF-650-BDT BATTERY-POWERED, SENSOR-OPERATED (0.5 GPM) FAUCET, W/BELOW DECK MIXING VALVE, PROWRAP 2000 INSULATION GUARDS & KOHLER 8998 P-TRAP WITH CLEANOUT. ADA COMPLIANT.
KS-1	KITCHEN SINK	1-1/2"	1-1/2"	1/2"	1/2"	KITCHEN SINK FURNISHED AND INSTALLED BY OTHERS.
EWC-1	ELECTRIC WATER COOLER	1-1/2"	1-1/2"	1/2"	1/2"	DUAL-LEVEL BARRIER FREE ELECTRIC WATER COOLER W/BOTTLE FILLING STATION, EQUAL TO ELKAY LZSTLGBWSLC, 8-GPH 115V/1Ø/60, 4.2 FLA. ADA COMPLIANT.
LT-1	LAUNDRY TRAY	2"	1-1/2"	1/2"	1/2"	WALL-MOUNTED MOLDED STONE EQUAL TO MUSTEE UTILATUB MODEL #18W WITH CHICAGO 897 FAUCET WITH HOSE CONN. VB (WATTS BA-ASSE 1011).
WH-1	EXTERIOR WALL HYDRANT	--	--	3/4"	--	WOODFORD MODEL 65 FREEZELESS WALL HYDRANT WITH HOSE CONN. VACUUM BREAKER FITTING & KEY OPERATED VALVE (ASSE 1011).
EWH-1	ELECTRIC WATER HEATER	--	--	3/4"	3/4"	WALL-HUNG ELECTRIC WATER HEATER 30 GALLON CAPACITY, 21 GPH @ 90° F RISE, BRADFORD WHITE LD-WH30L3-1, OR APPROVED EQUAL, 4500 WATT, 240V 1-PHASE, T&P RELIEF VALVE, R20 INSULATION, + 2 GAL EXPANSION TANK.
WS-1	WATER SOFTENER	OPEN SITE DRAIN	--	3/4"	--	HELLENBRAND MODEL PROMATE 6.0 OR APPROVED EQUAL. CAPACITY = 24,000 GRAIN, 0.75 CF RESIN, 9.8 GPM @ 10 PSIG MAX WPD, SOFTENER SIZE: 8"Ø x 44" H BRINE TANK; 18"Ø x 40" H (300 LB. SALT CAP.), 3/4" VALVE/MANIFOLD, METERED DEMAND-CONTROLLED REGENERATION. 1.3 GPM BACKWASH RATE.
FD-1	FLOOR DRAIN	3"	1 1/2"	--	--	POLISHED BRONZE ADJ. ROUNDTOP EQUAL TO SMITH MODEL 2005Y-A-PB. (NO HUB), 2005L-A-PB (CAULKED OUTLET) & PROSET TG3H TRAP GUARD.
FCO	FLOOR CLEANOUTS	SEE FLOOR PLAN	--	--	--	PROVIDE SMITH 4025C ROUND NICKEL BRONZE TOP.
HD-1	HUB DRAIN	SEE FLOOR PLAN	1 1/2"	--	--	STUB UP WASTE HUB RIM OUTLET 4" AFF WITH HUB OPENING TWICE THE SIZE OF THE PIPE, OR AS NOTED ON PLANS.
RP-BFP	REDUCED PRESSURE BACKFLOW PREVENTER	--	--	1"	--	REDUCED PRESSURE BACKFLOW PREVENTER WITH AIR CAP DRAIN (ASSE 1013), WATTS 009M20T-S.

PLUMBING SYMBOL SCHEDULE	
SYMBOL	DESCRIPTION
	WASTE BELOW GROUND
	WASTE ABOVE GROUND
	WATER SERVICE
	COLD WATER
	HOT WATER
	VENT
	UNDERGROUND VENT
	GAS LINE
	PIPE UP
	PIPE DOWN
	CLEAN OUT
	BALL VALVE
	CHECK VALVE
	UNION
	GAS VALVE
YCO	YARD CLEAN OUT
FCO	FLOOR CLEAN OUT
WCO	WALL CLEAN OUT
CV	CIRCUIT VENT
WH	WALL HYDRANT
VTR	VENT THROUGH ROOF
FD	FLOOR DRAIN
HD	HUB DRAIN
RV	RELIEF VENT
UG	UNDERGROUND
UV	UNDERGROUND VENT
WHA	WATER HAMMER ARRESTOR
WV	WET VENT
WVR	WASTE & VENT RISER



3 FLOOR DRAIN DETAIL
N.T.S.



4 YARD CLEANOUT DETAIL
N.T.S.

WATER SERVICE SIZING:

- 1) 47 _____ DEMAND OF BUILDING IN G.P.M.
- 2) 50 _____ PSI LOW PRESSURE AT MAIN IN STREET (ESTIMATED)
- 3) 6 _____ FT DIFFERENCE IN ELEVATION, MAIN TO METER.
- 4) 1 _____ IN SIZE OF WATER METER.
- 5) 120 _____ FT DEVELOPED LENGTH FROM MAIN TO METER.

AVAILABLE PRESSURE AFTER THE WATER METER:

- 1) 0.0 _____ PSI PRESSURE LOSS DUE TO FRICTION LOSS IN _____ INCH WATER SERVICE.
- 2) 2.6 _____ PSI PRESSURE LOSS DUE TO ELEVATION, MAIN TO METER.
- 3) 13.0 _____ PSI PRESSURE LOSS DUE TO METER.
- 4) 34.4 _____ PSI AVAILABLE PRESSURE AFTER THE WATER METER.

HOT WATER DISTRIBUTION SIZING:

PERMISSIBLE UNIFORM PRESSURE LOSS FOR FRICTION (A): (P.S.I./100' OF PIPE)

WHERE: $A = \frac{B - (C + D + E)}{F} \times 100$

A. 18.1 _____ PERMISSIBLE PRESSURE LOSS FOR FRICTION. (PSI/100' OF PIPE).

B. 34.4 _____ PSI AVAILABLE PRESSURE AFTER WATER METER

C. 8 _____ PSI PRESSURE NEEDED AT CONTROLLING FIXTURE.

D. 1.3 _____ PSI DIFFERENCE IN ELEVATION BETWEEN WATER METER AND CONTROLLING FIXTURE IN FEET 3 _____ x .434 PSI/FT.

E. 15 _____ PSI PRESSURE LOSS DUE TO WATER HEATER, FUTURE WATER TREATMENT DEVICES AND BACKFLOW PREVENTERS.

F. 60 _____ FT DEVELOPED LENGTH FROM WATER METER TO CONTROLLING FIXTURE IN FEET 40 _____ x 1.5.

COLD WATER DISTRIBUTION SIZING:

PERMISSIBLE UNIFORM PRESSURE LOSS FOR FRICTION (A): (P.S.I./100' OF PIPE)

WHERE: $A = \frac{B - (C + D + E)}{F} \times 100$

A. 31.4 _____ PERMISSIBLE PRESSURE LOSS FOR FRICTION. (PSI/100' OF PIPE).

B. 34.4 _____ PSI AVAILABLE PRESSURE AFTER WATER METER

C. 15 _____ PSI PRESSURE NEEDED AT CONTROLLING FIXTURE.

D. 1.3 _____ PSI DIFFERENCE IN ELEVATION BETWEEN WATER METER AND CONTROLLING FIXTURE IN FEET 3 _____ x .434 PSI/FT.

E. 0 _____ PSI PRESSURE LOSS DUE TO WATER HEATER, WATER TREATMENT DEVICES AND BACKFLOW PREVENTERS.

F. 60 _____ FT DEVELOPED LENGTH FROM WATER METER TO CONTROLLING FIXTURE IN FEET 40 _____ x 1.5.

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

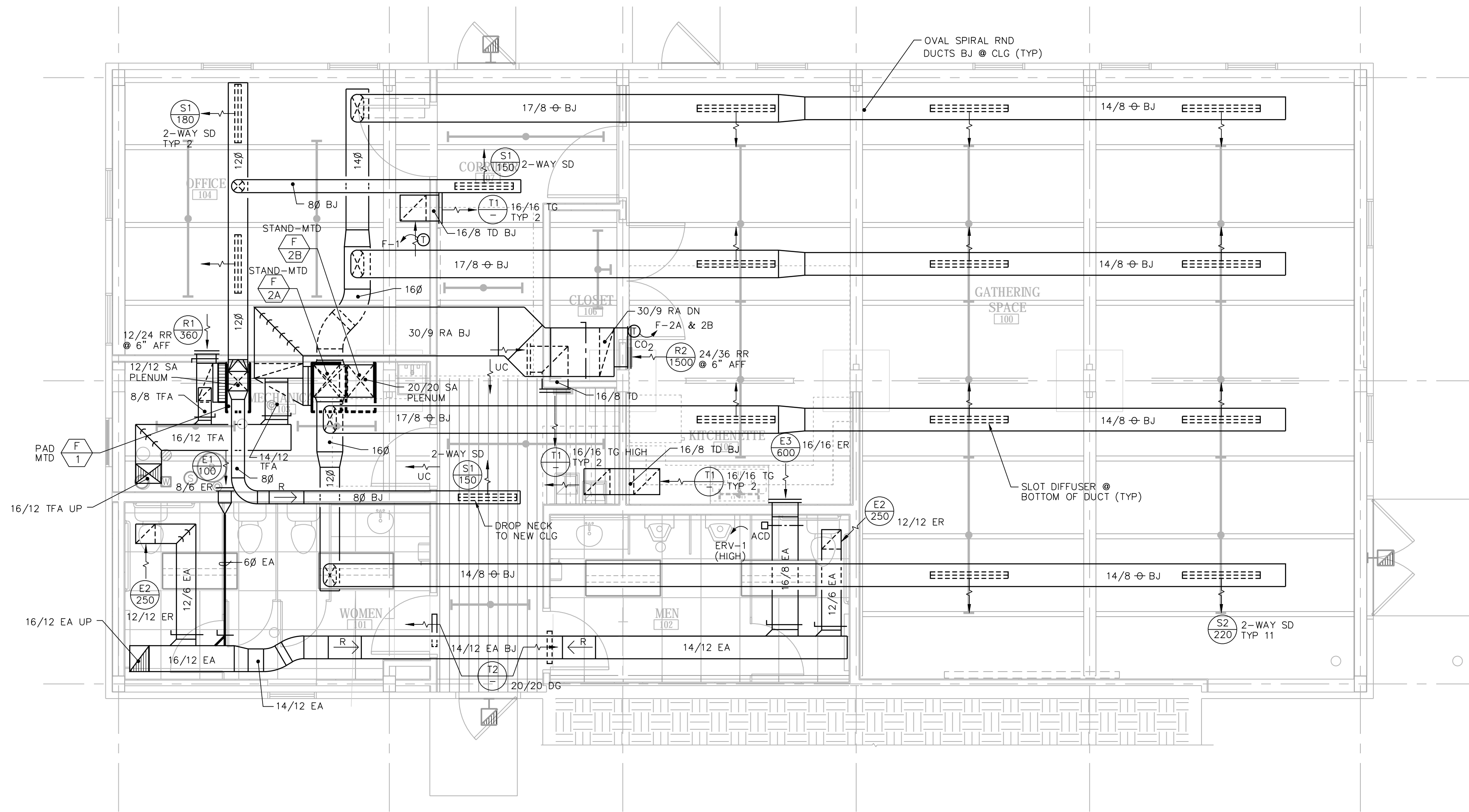
5682 State Hwy 19
Westport, WI 53597

DATE OF ISSUE: 4-25-2017

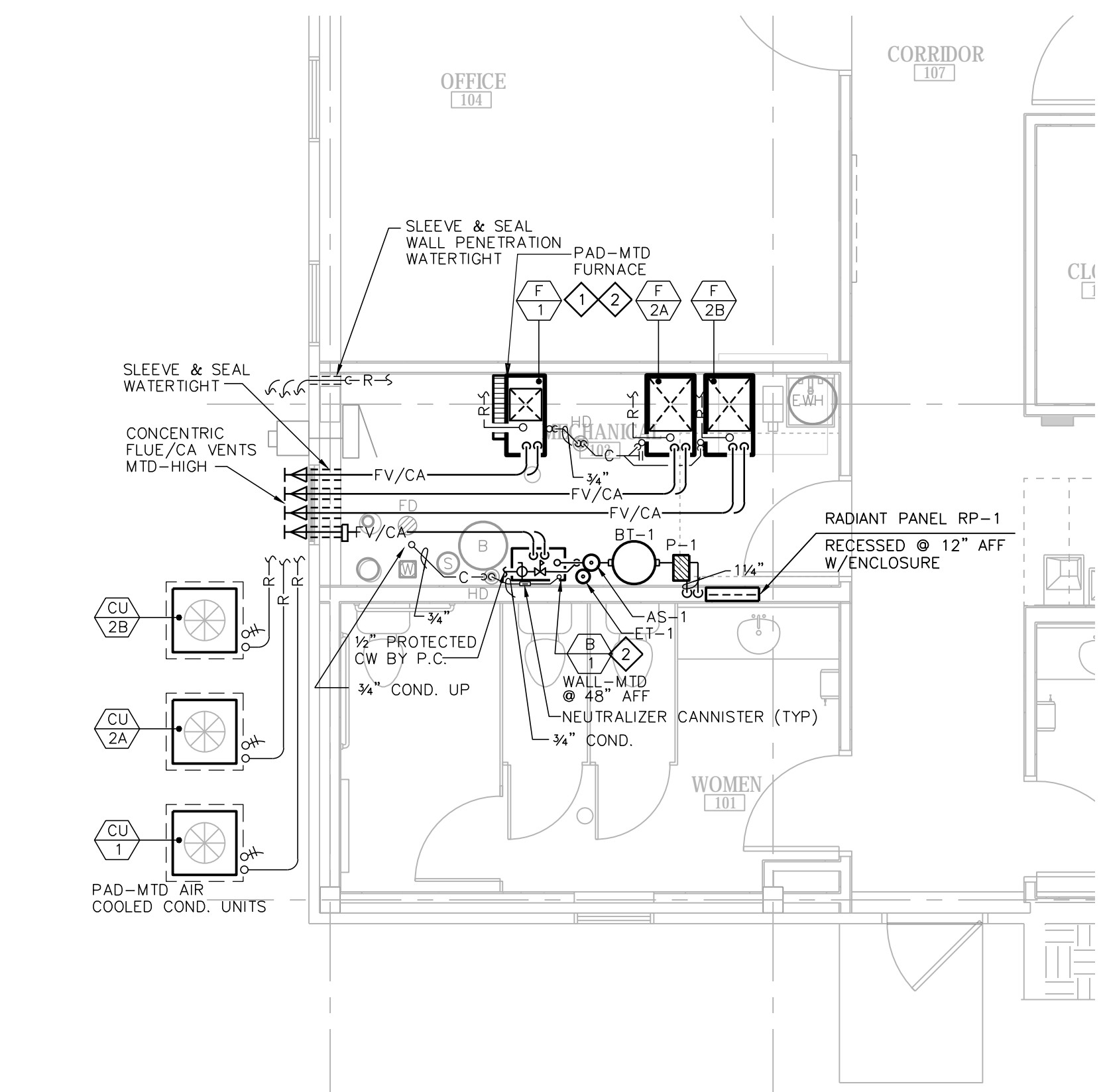
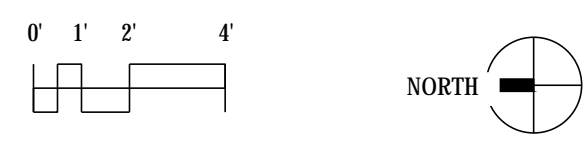
REVISIONS:

PROJECT # 14099

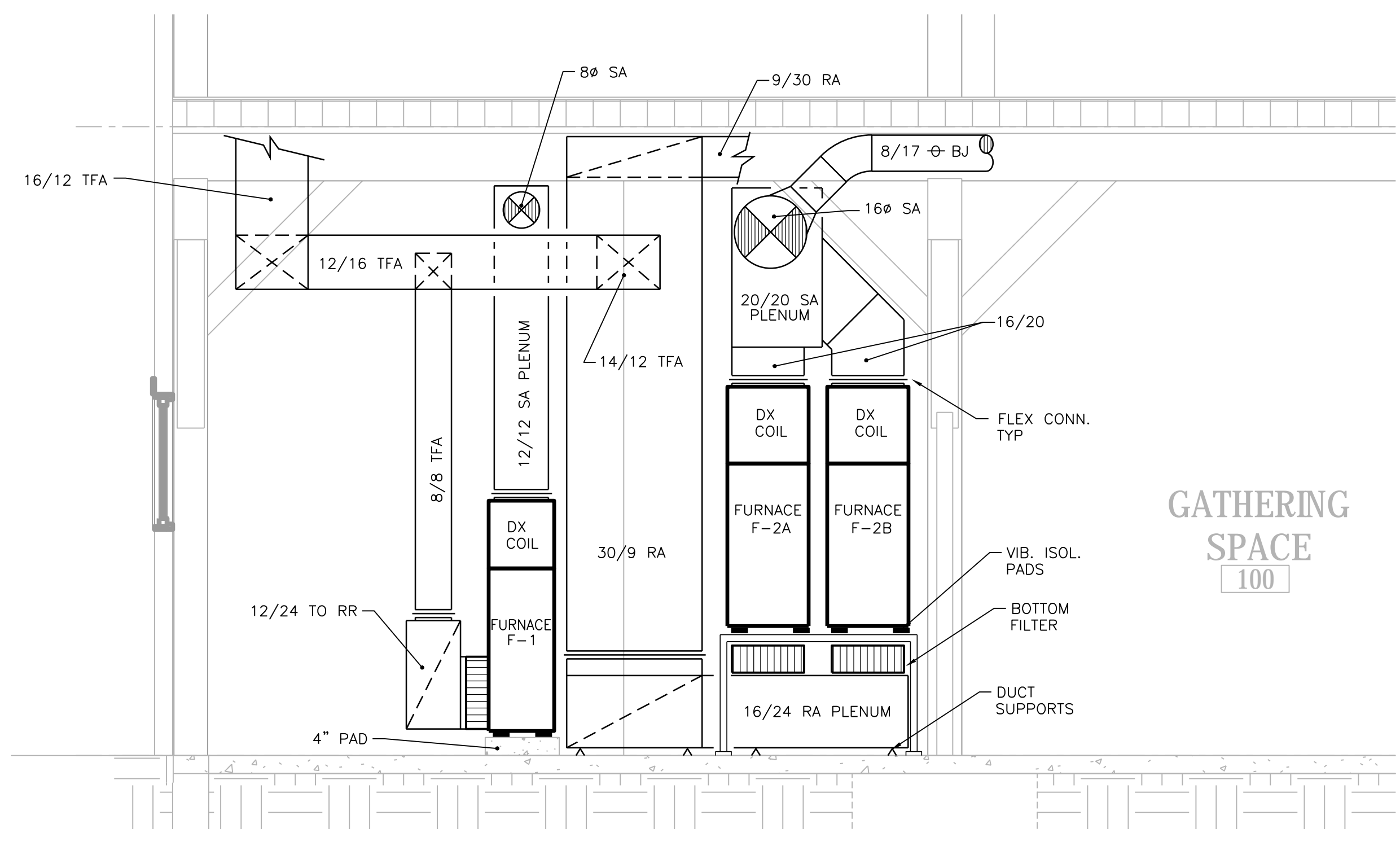
**PLUMBING RISERS,
SCHEDULES
& DETAILS**



1 GROUND FLOOR PLAN - HVAC DUCTWORK
1/4" = 1'-0"



2 PARTIAL FLOOR PLAN - HVAC PIPING
1/4" = 1'-0"



3 FURNACE F-1 & F-2A/2B ELEVATIONS
1/2" = 1'-0"

HVAC GENERAL NOTES:

1. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF HVAC WORK WITH OTHER TRADES.
2. COORDINATE PROVISIONS FOR OPENINGS IN NEW CONSTRUCTION WITH THE GENERAL CONTRACTOR FOR APPROVAL PRIOR TO STARTING WORK.
3. HVAC CONTRACTOR IS RESPONSIBLE FOR CUTTING AND PATCHING EXISTING WALLS, FLOORS & CEILING FOR NEW HVAC WORK, WHERE REQUIRED.
4. COORDINATE FINAL CEILING REGISTER AND GRILE LOCATIONS WITH OTHER TRADES.
5. CONCEAL ALL CONTROL WIRING IN FINISHED AREAS. EXPOSED CONTROL WIRING IN EMT CONDUIT..
6. COORDINATE PIPING AND DUCTWORK ROUTING WITH OTHER TRADES TO MAINTAIN SCHEDULED CEILING HEIGHTS.
7. PROVIDE PROPER SERVICE CLEARANCES AND ACCESS SPACE FOR ALL NEW EQUIPMENT.

HVAC PLAN NOTES:

1. EXTEND FURNACE/DX COIL CONDENSATE PIPE TO OSD BY PLUMBING TRADE. INSTALL NEUTRALIZER CANNISTERS PER MANUFACTURER'S RECOMMENDATIONS.
2. EXTEND COMBUSTION AIR/FLUE PIPING TO WALL TERMINATION WITH CONCENTRIC VENT.

6515 Grand Teton Plaza, Suite 120
Madison, Wisconsin 53719
p608.829.4444 f608.829.4445

dimensionvmadison.com



17 Applegate Court, Suite 200
Madison, WI 53713
Phone: (608) 288-9260
email: hein@chorus.net
Project No. H1430

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

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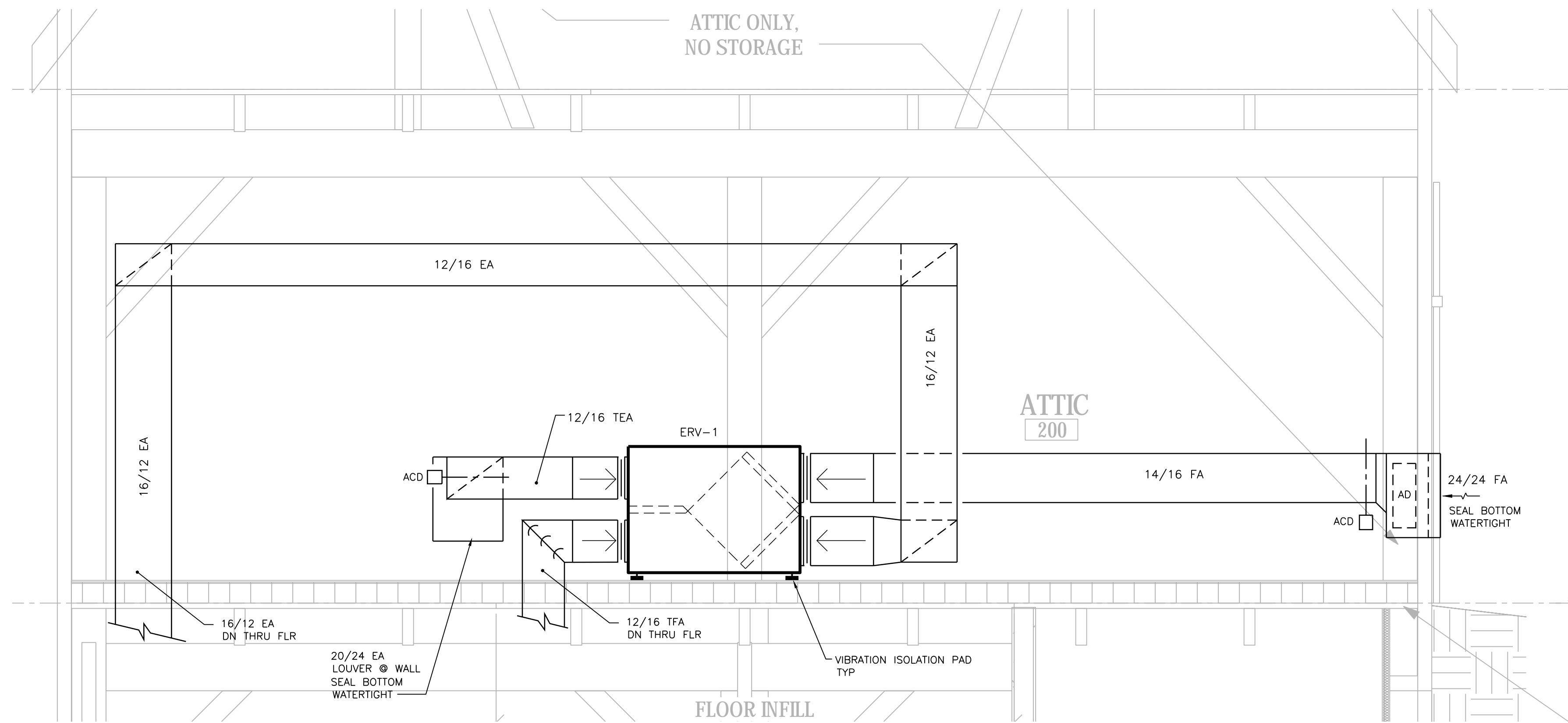
PROJECT # 14099

**GROUND
FLOOR PLANS -
HVAC**

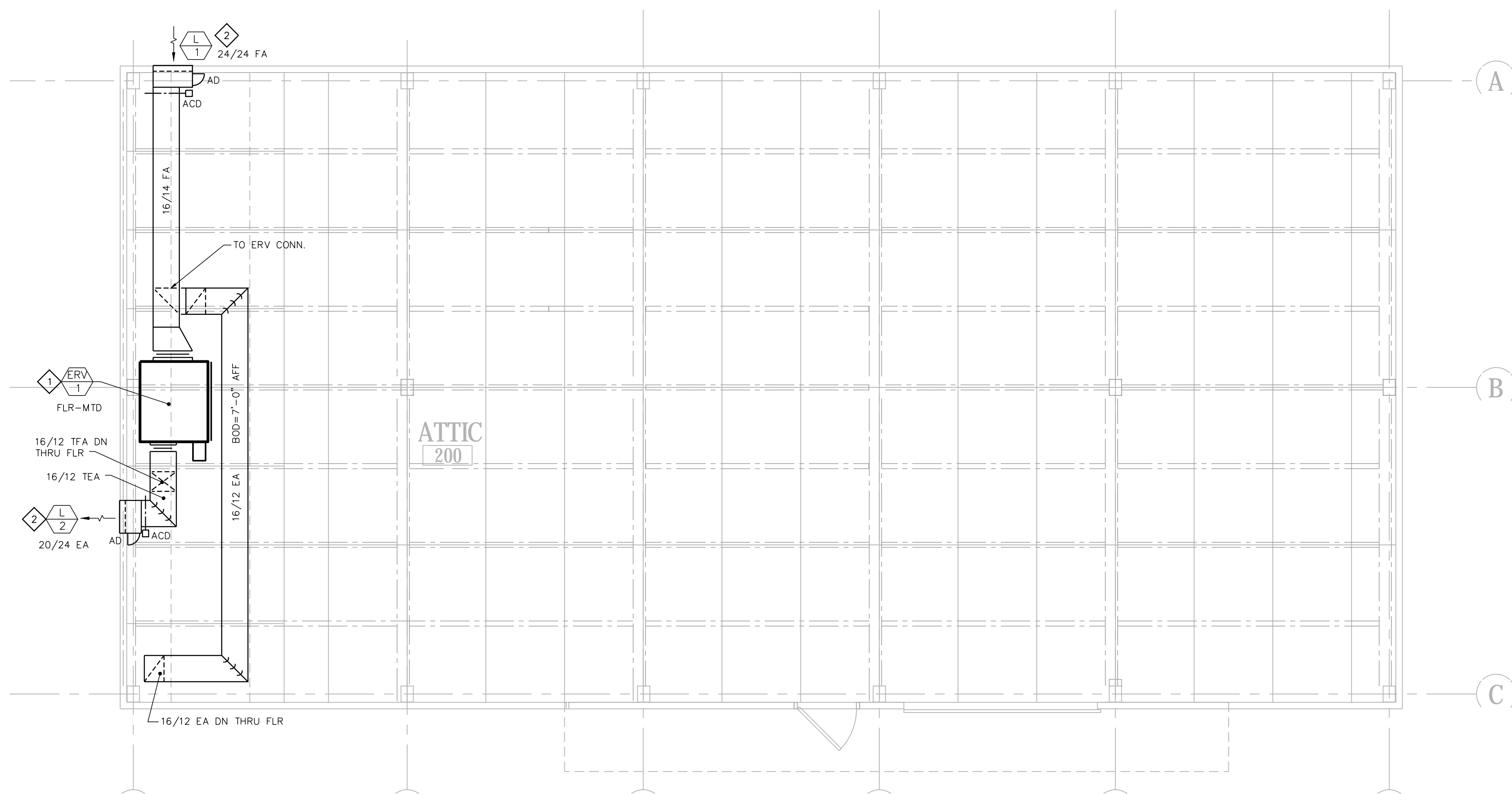
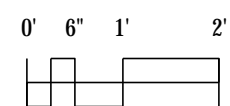
H1.1

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

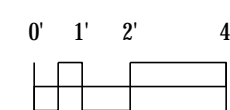
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2 ERV-1 ELEVATIONS
1/2" = 1'-0"



1 ATTIC PLAN - HVAC
1/4" = 1'-0"



HVAC GENERAL NOTES:

1. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF HVAC WORK WITH OTHER TRADES.
2. COORDINATE PROVISIONS FOR OPENINGS IN NEW CONSTRUCTION WITH THE GENERAL CONTRACTOR FOR APPROVAL PRIOR TO STARTING WORK.
3. HVAC CONTRACTOR IS RESPONSIBLE FOR CUTTING AND PATCHING EXISTING WALLS, FLOORS & CEILING FOR NEW HVAC WORK, WHERE REQUIRED.
4. COORDINATE FINAL CEILING REGISTER AND GRILLE LOCATIONS WITH OTHER TRADES.
5. CONCEAL ALL CONTROL WIRING IN FINISHED AREAS. EXPOSED CONTROL WIRING IN EMT CONDUIT.
6. COORDINATE PIPING AND DUCTWORK ROUTING WITH OTHER TRADES TO MAINTAIN SCHEDULED CEILING HEIGHTS.
7. PROVIDE PROPER SERVICE CLEARANCES AND ACCESS SPACE FOR ALL NEW EQUIPMENT.

HVAC ATTIC PLAN NOTES:

1. MOUNT ERV-1 ON VIBRATION ISOLATION PADS.
2. CUT AND PATCH EXISTING WALLS TO INSTALL NEW LOUVERS.

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REVISIONS:

PROJECT # 14099

**ATTIC FLOOR PLANS -
HVAC**

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

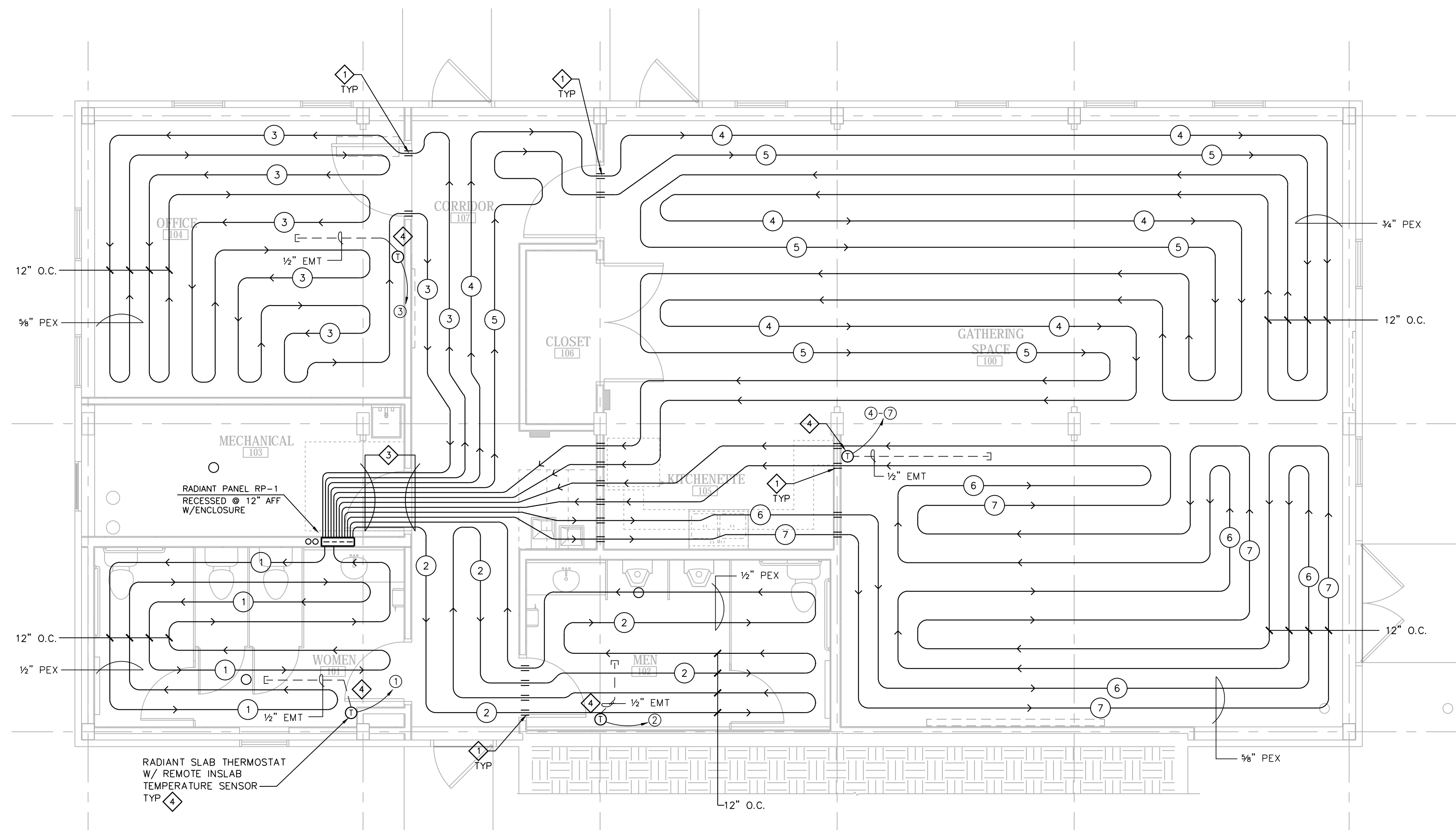
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HVAC GENERAL NOTES:

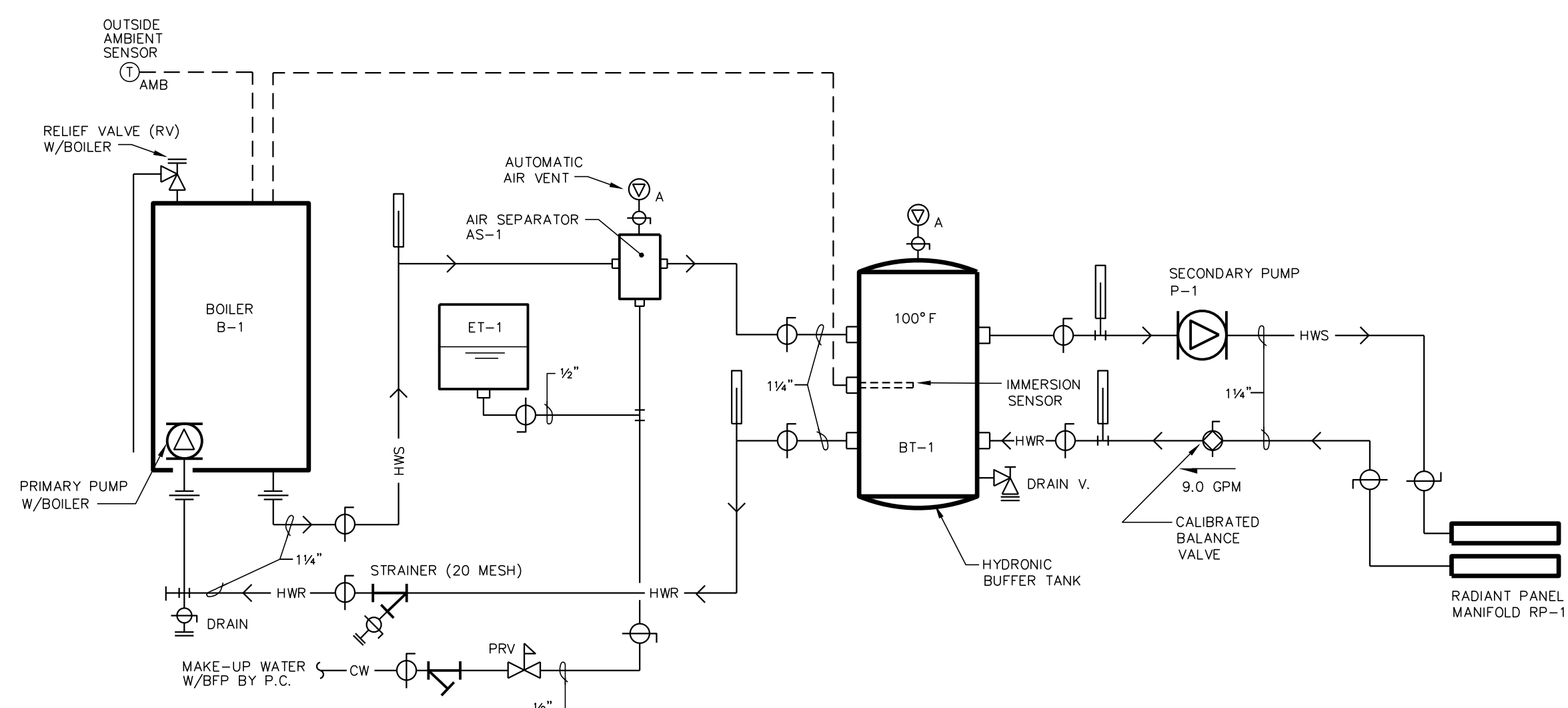
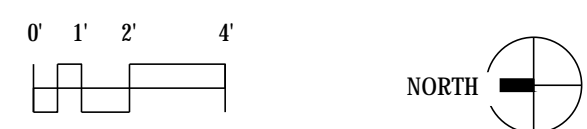
- HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF HVAC WORK WITH OTHER TRADES.
- COORDINATE PROVISIONS FOR OPENINGS IN NEW CONSTRUCTION WITH THE GENERAL CONTRACTOR FOR APPROVAL PRIOR TO STARTING WORK.
- CONCEAL ALL CONTROL WIRING IN FINISHED AREAS. EXPOSED CONTROL WIRING IN EMT CONDUIT.
- COORDINATE PIPING ROUTING WITH OTHER TRADES TO MAINTAIN SCHEDULED CEILING HEIGHTS.
- PROVIDE PROPER SERVICE CLEARANCES AND ACCESS SPACE FOR ALL NEW EQUIPMENT.
- PROVIDE ACCESS PANELS AT INACCESSIBLE CEILINGS FOR EQUIPMENT, WHERE REQUIRED.
- COORDINATE RADIANT FLOOR PIPE ROUTING LOCATIONS WITH GENERAL CONTRACTOR AND OTHER TRADES.

HVAC PLAN NOTES:

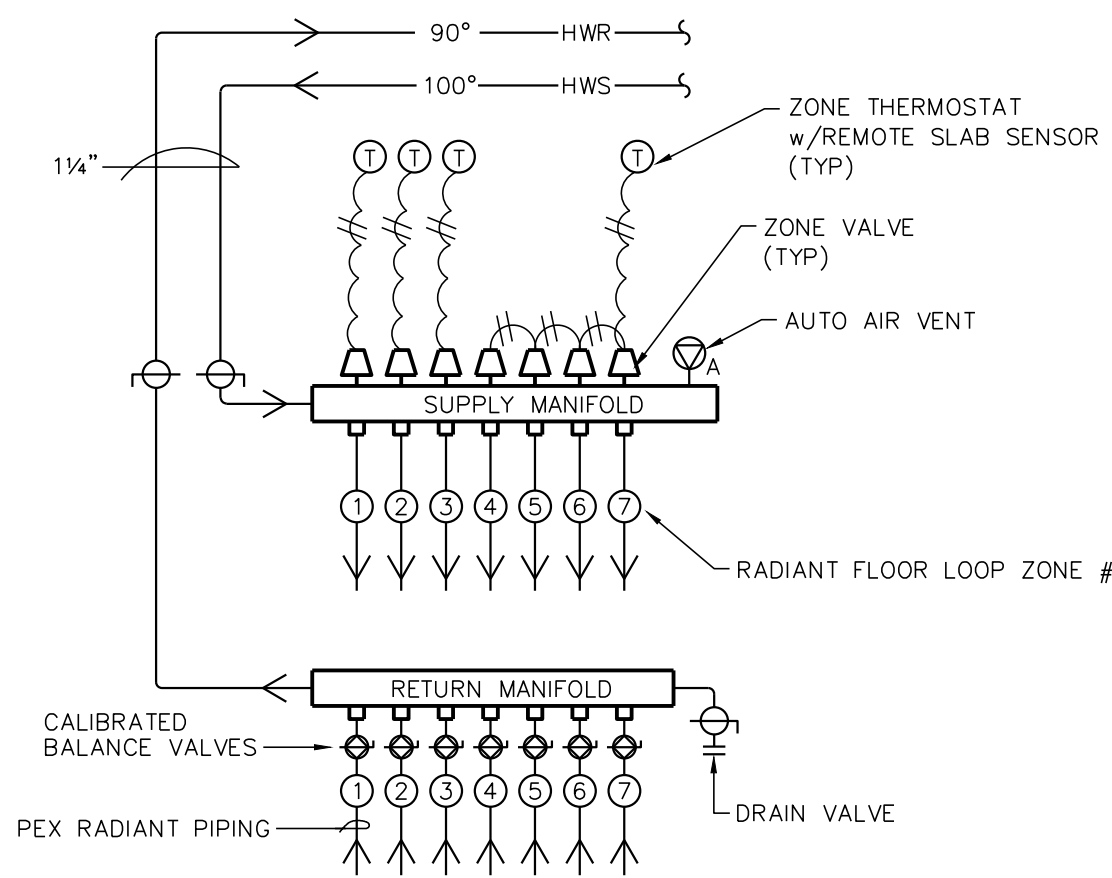
- ROUTE RADIANT FLOOR PEX PIPING THROUGH PROTECTIVE METAL SLEEVE (SCH 40 PIPE) UNDER INTERIOR WALLS. ROUTE ALL OTHER PEX PIPING THROUGH DOORWAYS.
- RADIANT FLOOR PIPING AT TYPICALLY 12" O.C. FOR PERIMETER 4 LOOPS. INTERIOR PIPING SPACING AS SHOWN ON PLAN.
- INSULATE SUPPLY RADIANT PIPING WITH 3/8" CLOSED CELL INSULATION BELOW MECH 103 AND CORRIDOR 108 FOR PIPING DESIGNATED.
- EXTEND REMOTE TEMPERATURE SENSOR INTO SLAB INSIDE 1/2" EMT ELECTRICAL CONDUIT WITH END PLUGGED.



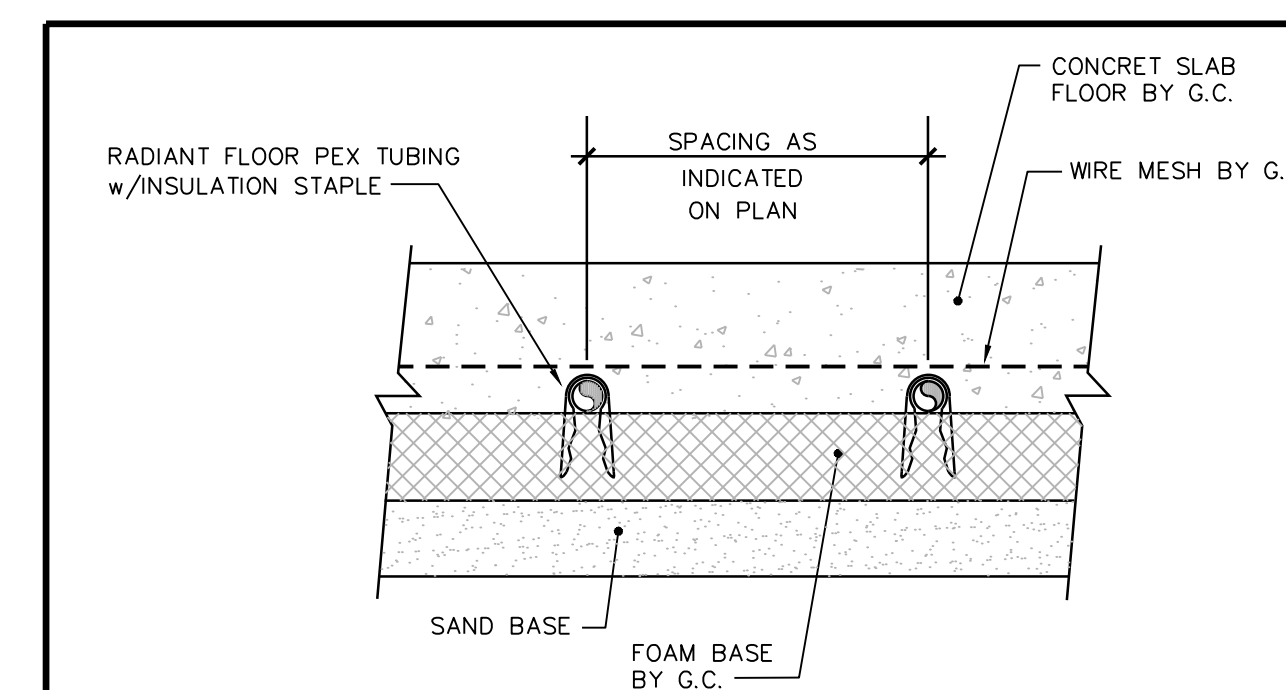
1 FIRST FLOOR PLAN - RADIANT FLOOR PIPING
1/4" = 1'-0"



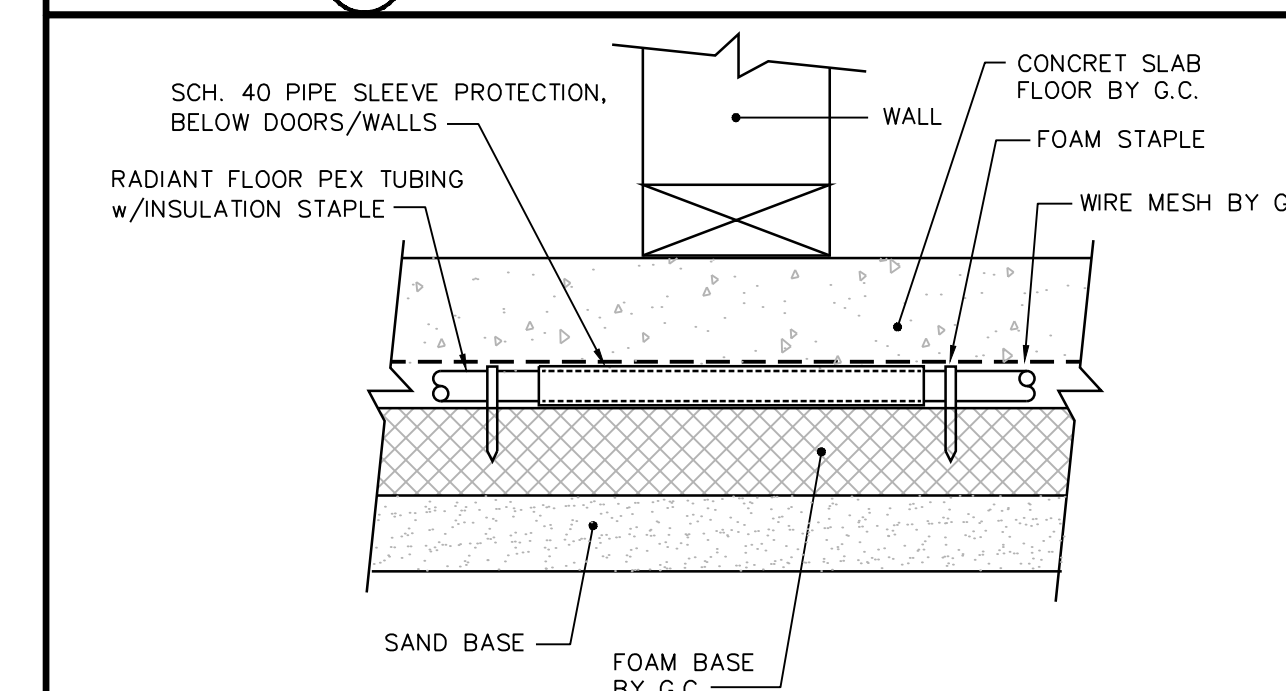
2 BOILER/HYDRONIC PIPING SCHEMATIC
N.T.S.



3 RADIANT MANIFOLD RP-1 PIPING DETAIL
N.T.S.



4 TYPICAL RADIANT SLAB SECTION
N.T.S.



5 TYPICAL RADIANT TUBE PROTECTION SLEEVE
N.T.S.

DATE OF ISSUE: 4-25-2017

REVISIONS:

PROJECT # 14099

**GROUND
FLOOR PLAN -
RADIANT HEAT**

H1.3

PUMP SCHEDULE	
TAG	P-1
MANUFACTURER	GRUNDFOS
MODEL NO.	ALPHA 15-55-SF
TYPE	INLINE
LOCATION	MECH. 103
SERVICE	HW BOILER SECONDARY PUMP
GPM	9
TDH (FT)	10
BHP (WATTS)	(45)
EFFICIENCY (%)	N.A.
SUCTION I.D.	1-1/4"
OUTLET I.D.	1-1/4"
MOTOR HORSEPOWER	1/15
VOLTAGE/PHASE	115/1
FLA	0.65
REMARKS:	RADIANT FLOOR PUMP
① VARIABLE-SPEED (ECM MOTOR) PUMP, SET @ CONSTANT PRESSURE II.	

CONDENSING UNITS SCHEDULE			
GENERAL TAG	CU-1	CU-2A & 2B	
MANUFACTURER	CARRIER	CARRIER	
MODEL NO.	24ABB3-18	24ABB3-36	
REF. TYPE	R-410A (PURON)	R-410A (PURON)	
COOLING CAP. MBH	17.5	34.0	
AMBIENT TEMP.(F)	91	91	
SEER (EER)	13.0 (11.0)	13.0 (11.0)	
COND. DISCHARGE	VERTICAL	VERTICAL	
COND. COIL AREA SF	8.4	13.13	
COND. FAN CFM	1792	2954	
REF. LINE SIZE: RS RL	3/4" 3/8"	7/8" 3/8"	
ELECTRICAL: VOLTAGE/PHASE	230/1	230/1	
FAN F.L.A.	0.5	1.4	
COMP. F.L.A.	9.0	15.3	
MIN. CKT AMPS	11.8	21.5	
MOCP AMPS	20	30	
REMARKS:	①②③④⑤	①②③④⑤	
SCROLL COMPRESSOR w/F-1		SCROLL COMPRESSOR w/F-2A & 2B (2 REQ'D)	
① CRANKCASE HEATER. ② COMPRESSOR START-ASSIST CAPACITOR AND RELAY. ③ THERMOSTATIC EXPANSION VALVE (TXV) @ EVAPORATOR COIL. ④ LOW-AMBIENT OPERATION WITH CONDENSER FAN SPEED CONTROL (MOTOR MASTER). ⑤ BALL BEARING FAN MOTOR.			

ENERGY RECOVERY VENTILATOR SCHEDULE	
GENERAL TAG	ERV-1
MANUFACTURER	RENEWAIRE
MODEL NO.	HEX2XINH
ARRANGEMENT	INDOOR HORIZONTAL WALL-MTD
TYPE	ENTHALPIC STATIC PLATE
FROST CONTROL	N.R.
EXHAUST AIR CFM	1200
EXT. SP "w.g."	0.75
FAN HP (BHP)	1-1/2 (0.60)
RPM	1190
DRIVE	DIRECT
FRESH AIR CFM	1200
EXT. SP "w.g."	0.75
FAN HP (BHP)	1-1/2 (0.6)
RPM	1190
DRIVE	DIRECT
COOLING MODE: FRESH AIR EAT db/wb F	91/74
FRESH AIR LAT db/wb F	79.2/68.3
EXHAUST AIR EAT db/wb F	75/64
TOTAL (SENSIBLE) EFFECTIVENESS	61% (74%)
HEATING MODE: FRESH AIR EAT db F	-15
FRESH AIR LAT db F	47.9
EXHAUST AIR EAT db/wb F	70/51.5
SENSIBLE EFFECTIVENESS	74%
FILTERS: TYPE	2" T.A. 30% EFF. (MERV 8)
QTY/SIZES	(4) 20"x20"x2"
ELECTRICAL: VOLTAGE/PHASE	230/1
FLA	9.6 + 9.6
MCA	20.6
MOCP UNIT	25
REMARKS:	W/F-1&F-2A, 2B UNIT WT= 442 lbs ①②③
① FLOOR MOUNT UNIT WITH FLEXIBLE DUCT CONNECTORS & VIBRATION ISOLATION PADS. ② INTERLOCK HX WITH ASSOCIATED FURNACE UNIT OCCUPIED MODE. ③ VFD MOTORS CONTROLLED BY 0-10 VDC SPEED CONTROL SIGNAL. BALANCE UNIT FOR 50% + 100% AIR FLOW.	

FURNACE UNIT SCHEDULE		
GENERAL TAG	F-1	F-2A & 2B
MANUFACTURER	CARRIER	CARRIER
MODEL NO.	59TPSA 040E14-10	59TPSA 060E17-14
TYPE	VERTICAL SEALED COMB. UPFLOW SIDE RETURN	VERTICAL SEALED COMB. BOTTOM RETURN
ARRANGEMENT	UPFLOW SIDE RETURN	BOTTOM RETURN
EAN: CFM	600	1200
ESP ("WG)	0.80	0.80
SPEED	ECM-4/YELLOW	ECM-5/GRAY
MIN. FA CFM (%)	240 (40%)	480 (40%)
EXT. SP "w.g."	0.75	0.75
DEF. COIL MANUFACTURER	CARRIER	CARRIER
MODEL NO.	CNPVP-1814	CNPVP-3617
COIL APD ("WG)	0.18	0.26
DRIVE	DIRECT	DIRECT
COOLING CAP. (MBH)	17.5	34.0
SENSIBLE CAP. (MBH)	14.1	27.5
EAT DB/WB (deg F)	78/64.5	78/64.5
LAT DB/WB (deg F)	57.7/57.5	56.9/55.9
BURNER INPUT (MBH) HIGH/LOW	40/26	60/39
OUTPUT (MBH) HIGH/LOW	38.6/25.1	57.8/37.6
EAT DB (deg F)	61.2	61.2
LAT DB (deg F) HIGH/LOW	120.5/99.8	105.6/90.1
AFUE%	96.5%	96.3%
FILTER SECTION: TYPE	PLEATED (MERV 13)	PLEATED (MERV 13)
QUANTITY/AREA SF	1/23.1	1/28.6
SIZE: DIMENSIONS: WxHxD NOM	16 25"x16"x4 1/2"	20 25"x20"x4 1/2"
FILTER FRAME	EXTERNAL	EXTERNAL
ELECTRICAL: HORSEPOWER	1/2	3/4
VOLTAGE/PHASE	115/1	115/1
FAN FLA	6.8	9.9
UNIT FLA	7.5	10.7
MIN. CKT. AMP.	10.3	14.3
MOCP	15	15
REMARKS:	①②③④	①②③④⑤
1 1/2-TON UNIT		3-TON UNITS (2 REQ'D)
① FILTER UNIT SHALL BE EQUAL TO CARRIER MODEL EXPXUNV03 SERIES. ② CONCENTRIC FLUE/COMBUSTION AIR WALL VENTS. ③ FRESH AIR TEMPERED BY ERV. ④ MOUNT FURNACE ON VIBRATION ISOLATION PADS. ⑤ TWIN UNIT CONTROL.		

HVAC SYMBOL SCHEDULE			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
—HWS—	HOT WATER SUPPLY PIPING		DIFFUSER/REGISTER/GRILLE TYPE CFM
—HWR—	HOT WATER RETURN PIPING		EXHAUST CFM
—C—	CONDENSATE PIPING		EQUIPMENT SYMBOL NO.
—R—	REFRIGERANT PIPING		THERMOSTAT
—CA—	COMBUSTION AIR		THERMOSTAT/CARBON DIOXIDE SENSOR
—FV—	FURNACE VENTS		SQUARE/RECTANGULAR SUPPLY DIFFUSER, GRILLE OR REGISTER-HORIZONTAL MOUNT
—O—	PIPE UP		SQUARE/RECTANGULAR RETURN/EXHAUST REGISTER OR GRILLE-HORIZONTAL MOUNT
—D—	PIPE DOWN		SUPPLY REGISTER OR GRILLE VERT. MOUNT
	BALL VALVE		RETURN/EXHAUST REGISTER OR GRILLE VERT. MOUNT
	PRESSURE RELIEF VALVE		VERTICAL SUPPLY DUCT UP
	DRAIN VALVE		VERTICAL RETURN/EXHAUST DUCT UP
	SWING OR LIFT CHECK VALVE		VERTICAL SUPPLY DUCT DOWN
	PRESSURE REDUCING VALVE		VERTICAL RETURN/EXHAUST DUCT DOWN
	CALIBRATED BALANCING VALVE		VOLUME DAMPER
	INLINE STRAINER		FIRE DAMPER W/ACCESS PANEL
	UNION		AUTOMATIC CONTROL DAMPER
	FLANGE		FLEXIBLE CONNECTION
	END CAP OR BLIND FLANGE		ROUND/FLEXIBLE DUCT
	THERMOMETER		ROUND RIGID DUCT
	PRESSURE GAUGE		SQUARE ELBOW W/TURNING VANES
	FLEXIBLE CONNECTION		RADIUS ELBOW R/D = 1.5
	T & P TEST WELL		RADIUS TAKEOFF R/D = 1.5 "x"=TAKE-OFF WIDTH
	A-AUTOMATIC AIR VENT		DUCT RISE(R) OR DROP(D)
	M-MANUAL AIR VENT		TEMPERATURE CONTROL PANEL
	REDUCER, CONCENTRIC	EQUIPMENT SYMBOLS	
	IMMERSION WELL		BOILER
	AUTOMATIC CONTROL DAMPER		CONDENSING UNIT
	ABOVE FINISHED FLOOR		ENERGY RECOVERY VENTILATOR
	BOTTOM OF DUCT		FURNACE
	DOOR GRILLE		LOUVER
	EXHAUST AIR		PUMP
	FRESH AIR		RADIANT PANEL
	MOTORIZED BACKDRAFT DAMPER		
	OPEN END DUCT		
	RETURN AIR		
	SUPPLY AIR		
	TEMPERATURE CONTROL PANEL		
	TRANSFER DUCT		
	TEMPERED EXHAUST AIR		
	TEMPERED FRESH AIR		
	TRANSFER GRILLE		
	UNDERCUT DOOR		
	VOLUME DAMPER		
	ROUND DUCT DIAMETER		
	OVAL DUCT DIMENSIONS		

RP-1 RADIANT FLOOR SCHEDULE							
LOOP #	1	2	3	4	5	6	7
SERVICE	WOMEN 101	MEN 102 CORR. 108	OFFICE 104 CORR. 107	GATHERING SPACE 100	GATHERING SPACE 100	GATHERING SPACE 100	GATHERING SPACE 100
UPWARD LOAD(BTUH/FT ²)	20	20	20	20	20	20	20
TOTAL LOAD(BTUH/FT ²)	24	24	24	24	24	24	24
TOTAL LOAD(BTU/HR)	3700	4300	6500	8400	8400	6100	6100
FLR COVERING R-VALUE	0	0	0	0	0	0	0
PNL SURFACE TEMP(F)	85	85	85	85	85	85	85
AREA (FT)	155	180	270	350	350	255	255
TUBE SIZE (IN)	1/2"	1/2"	5/8"	3/4"	3/4"	5/8"	5/8"
ROOM LOOP LENGTH(FT)	120	140	200	260	245	200	195
LEADER LENGTH (FT)	5	15	30	30	30	30	30
TOTAL LOOP LENGTH(FT)	125	155	230	290	275	230	225
EWV (F)	90	90	90	90	90	90	90
FLOW (GPM)	0.7	0.9	1.3	1.7	1.7	1.2	1.2
LOOP WPD (FT)	2.5	4.9	5.6	5.4	5.2	4.9	4.8
MANIFOLD TOTALS:							
SUPPLY WATER TEMP (F) =	100						
RETURN WATER TEMP (F) =	90						
ROOM SPACE TEMP (F) =	70						
MANIFOLD FLOW (GPM) =	8.7						
MANIFOLD HEATING CAP (MBH) =	43.5						
MANIFOLD SIZE =	1 1/4"						

LOUVER SCHEDULE							
TAG	MANUFACTURER	MODEL	TYPE	METAL	LOUVER DEPTH x W x HT	FREE AREA S.F.	SERVICE
L-1	VENT PRODUCTS	2730-31-34	STAT.	EXT. ALUM.	4" x 24" x 24"	1.76	FRESH AIR
L-2	VENT PRODUCTS	2730-31-34	STAT.	EXT. ALUM.	4" x 24" x 24"	1.76	EXHAUST AIR
① BIRD SCREEN - ALUM. ② ALUM SUB-FRAME (BUCK FRAME). ③ POWDER COAT BAKED ENAMEL FINISH; FINAL COLOR SELECTION BY ARCHITECT.							

HOT WATER SPECIALTIES SCHEDULE					
TAG	SERVICE	MANUFACTURER	MODEL NO.	CAPACITY	REMARKS
EXPANSION TANK - ET	HW	B&G	HFT-30	2.5 ACCEPT. VOL (GAL.)	DIAPHRAM EXP TANK (4.4 GAL.) CHARGE TO 12 PSIG
PRESSURE REDUCING VALVE (PRV)	HW	B&G	B38	1/2" NPT	12 PSIG SETTING; BRASS BODY
AIR SEPARATOR - AS	HW	SPIROTHERM	V-JR-125-TM	1 1/4"	w/AUTO AIR VENT
HYDRONIC BUFFER TANK - BT	HW	BOILER BUDDY	BB-18	18 GAL	QUAD CONNECTIONS 1 1/4" x 46" W/DRAIN AUTO AIR VENT & THERMOWELL
CALIBRATED BALANCE VALVES	HW	B&G	CB SERIES	SEE PLAN FOR SIZES	

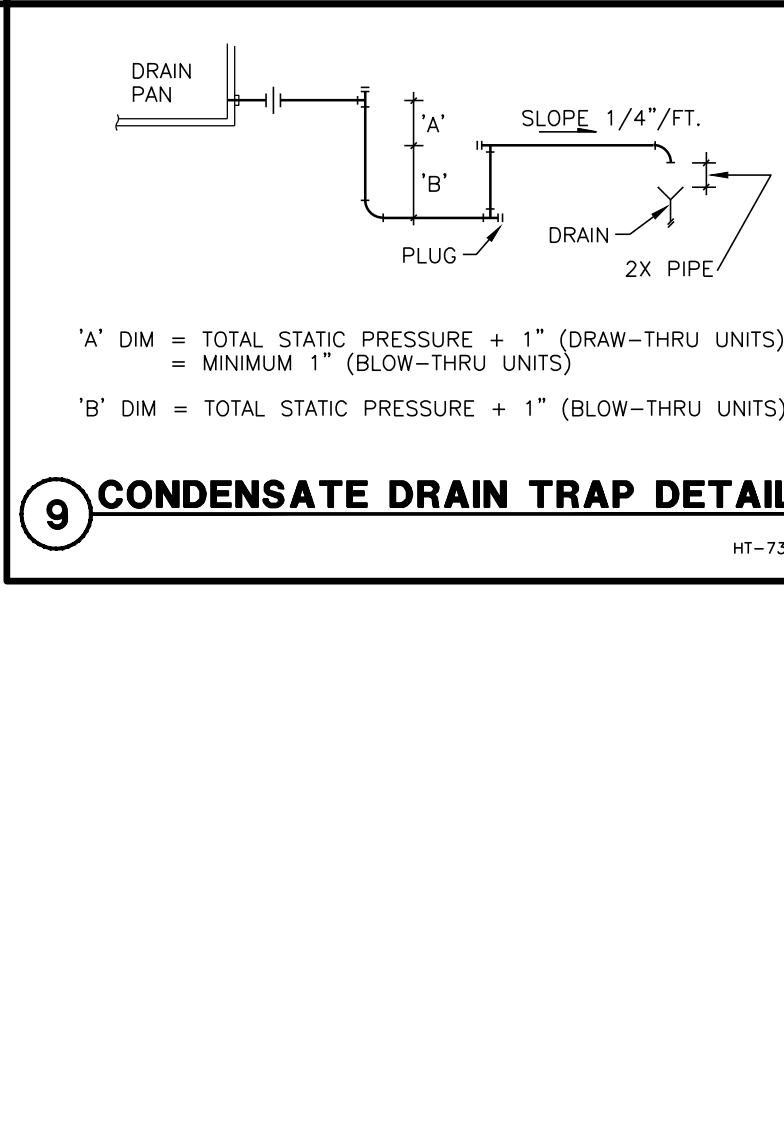
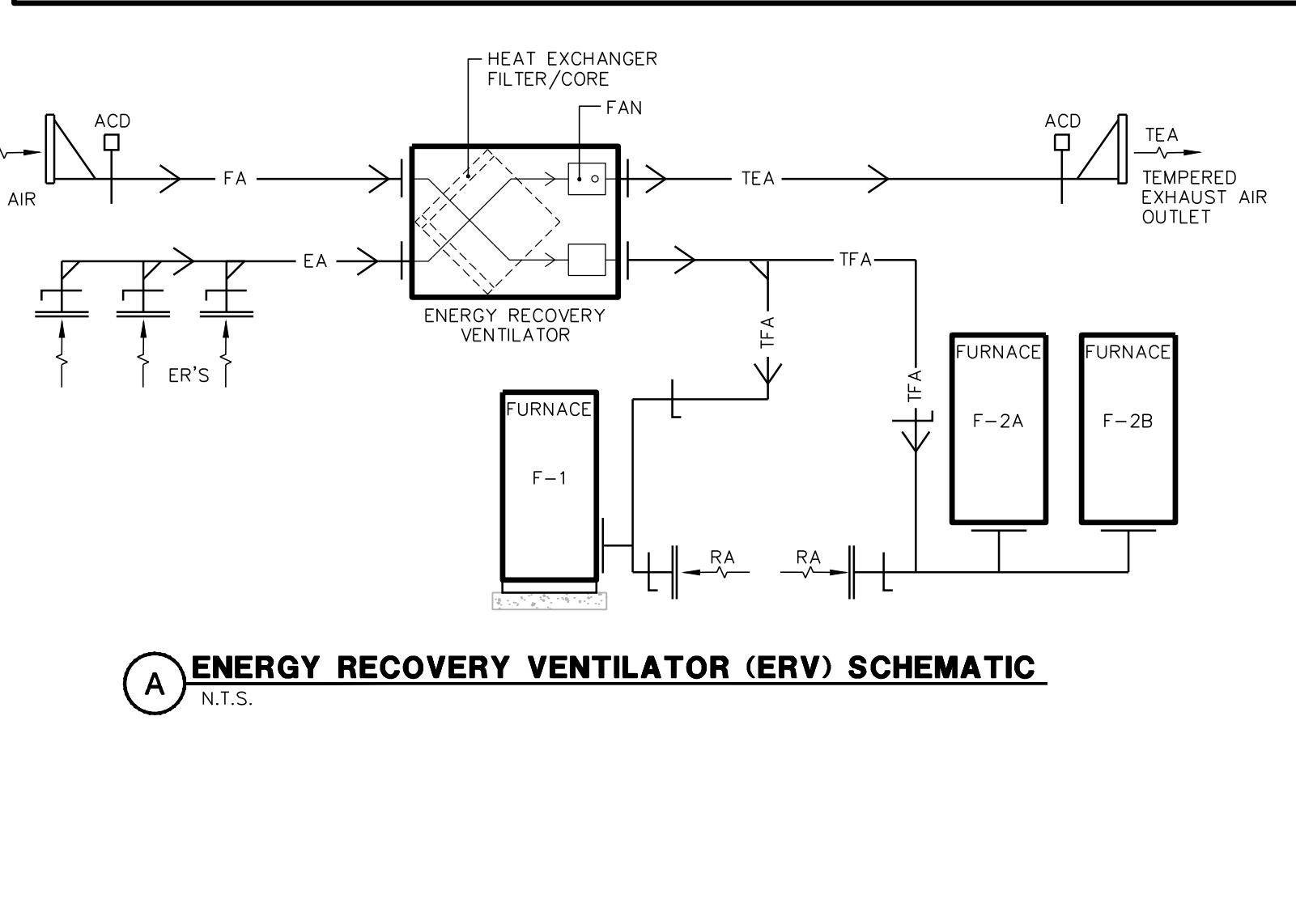
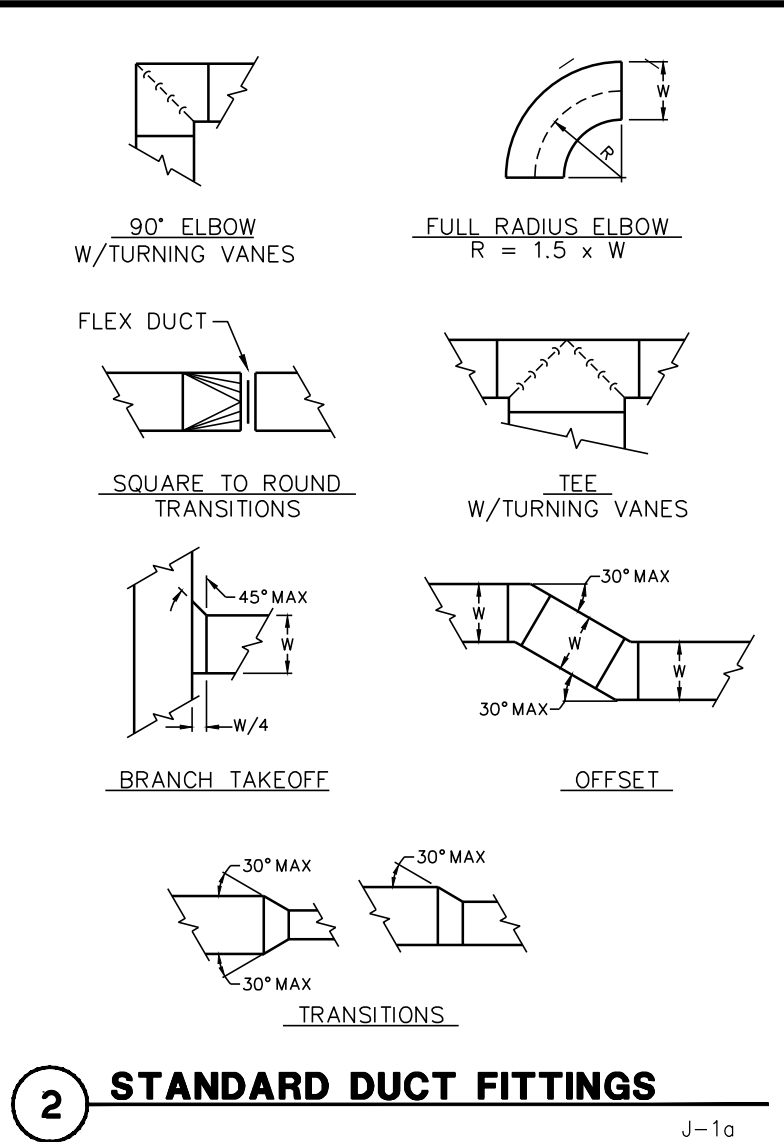
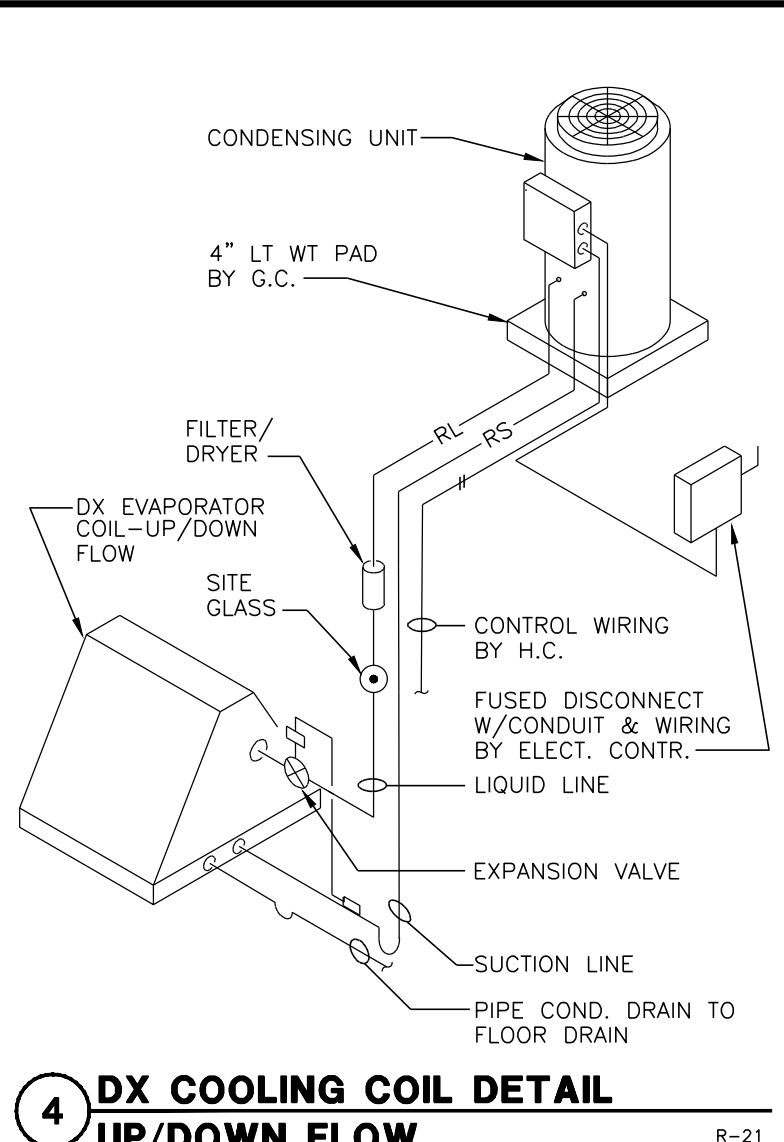
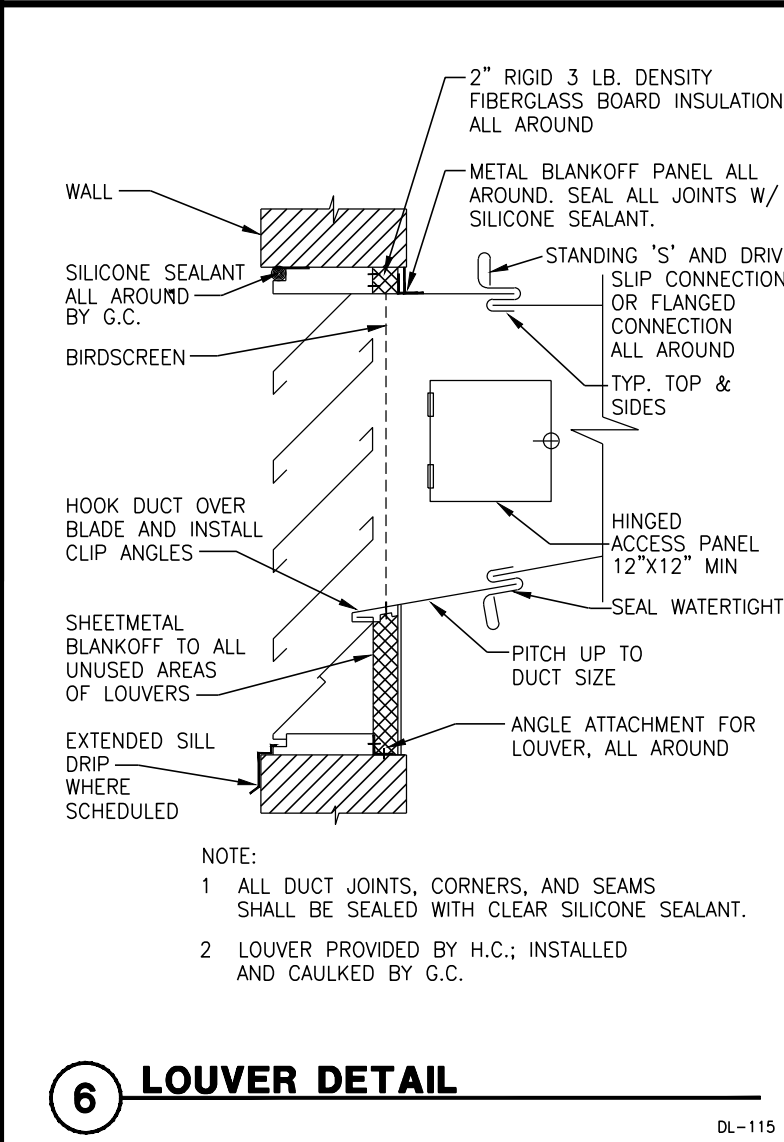
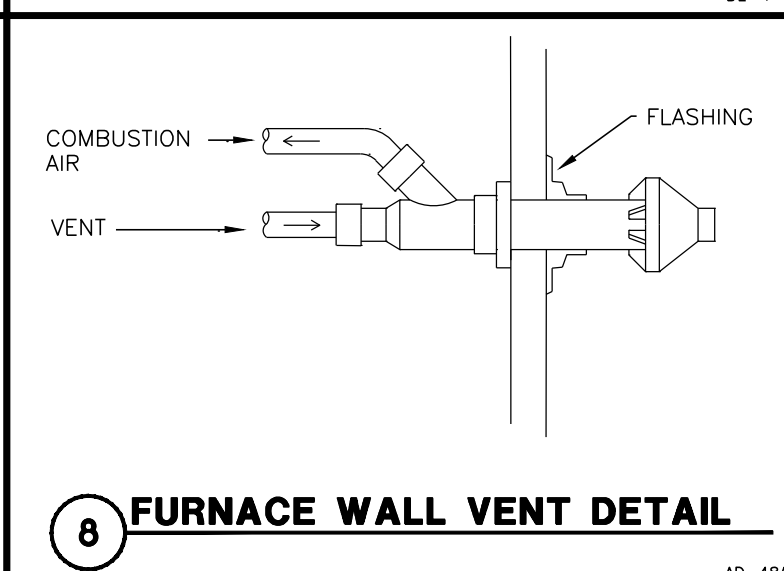
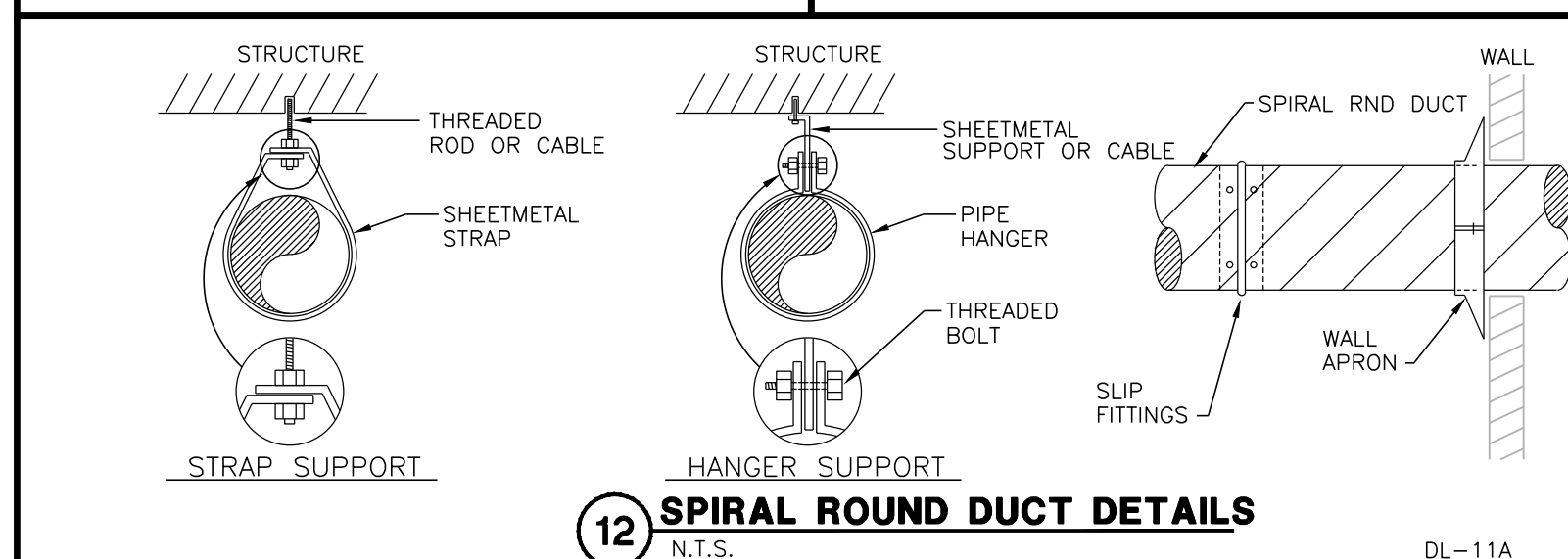
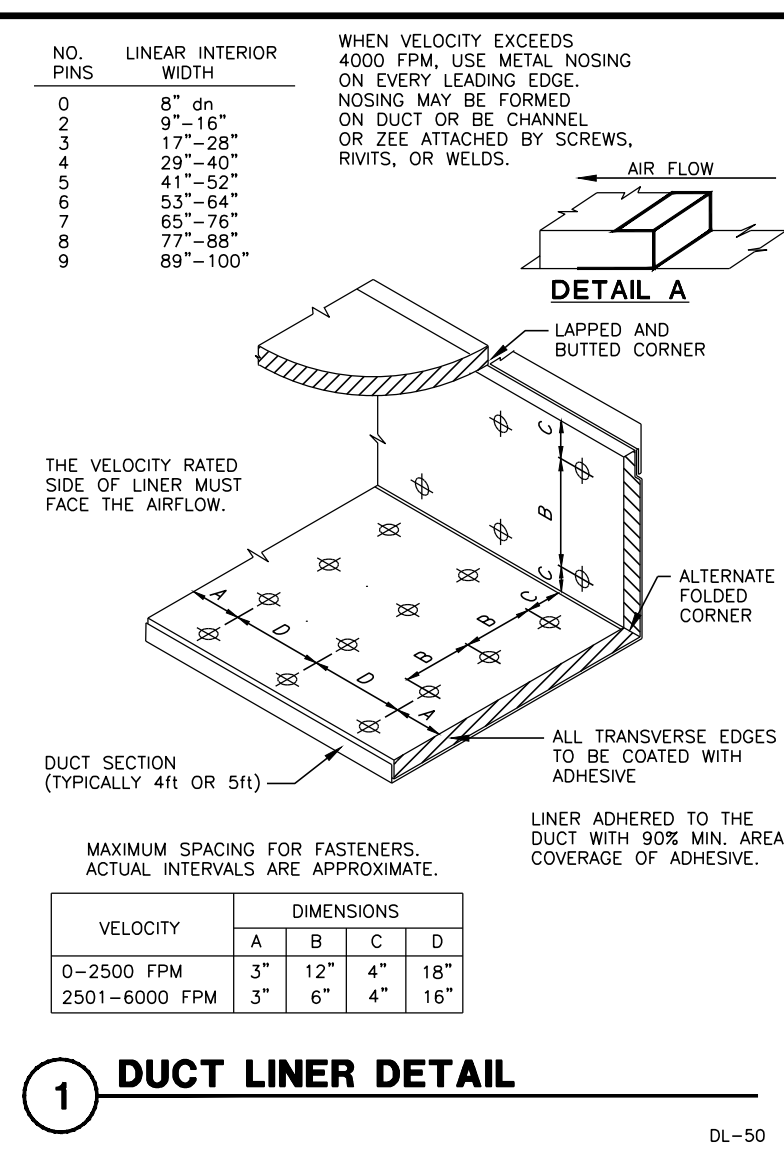
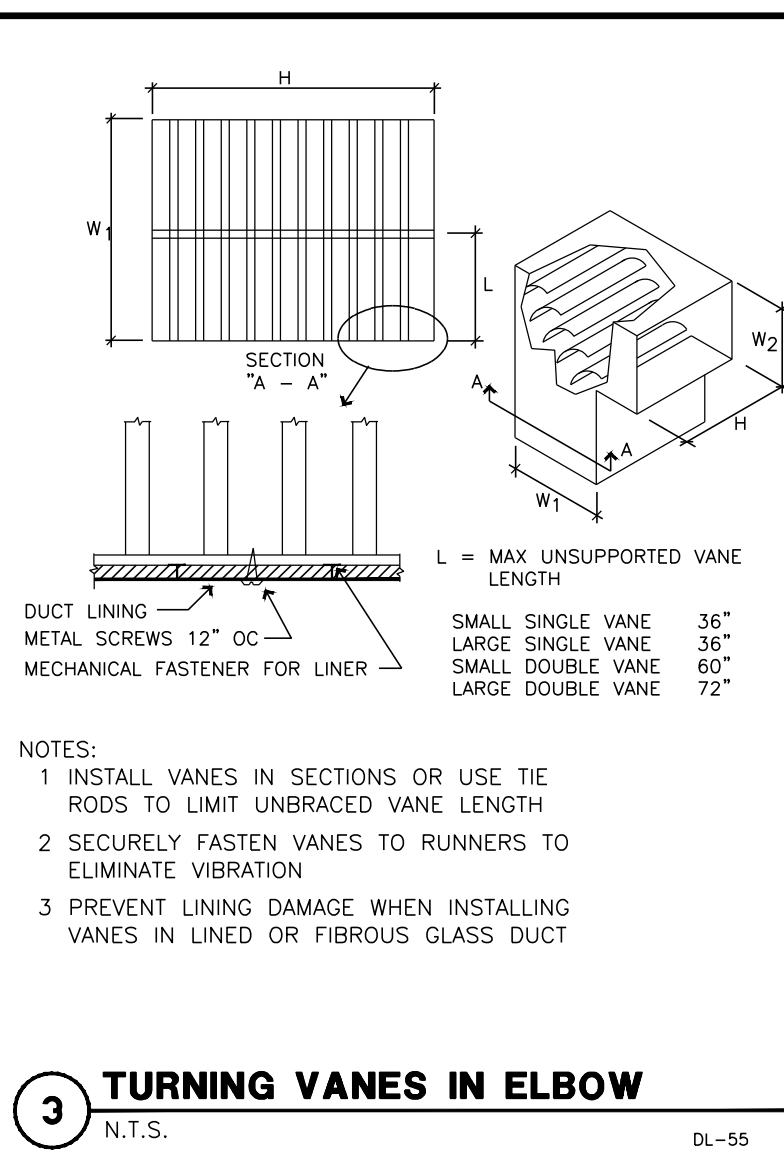
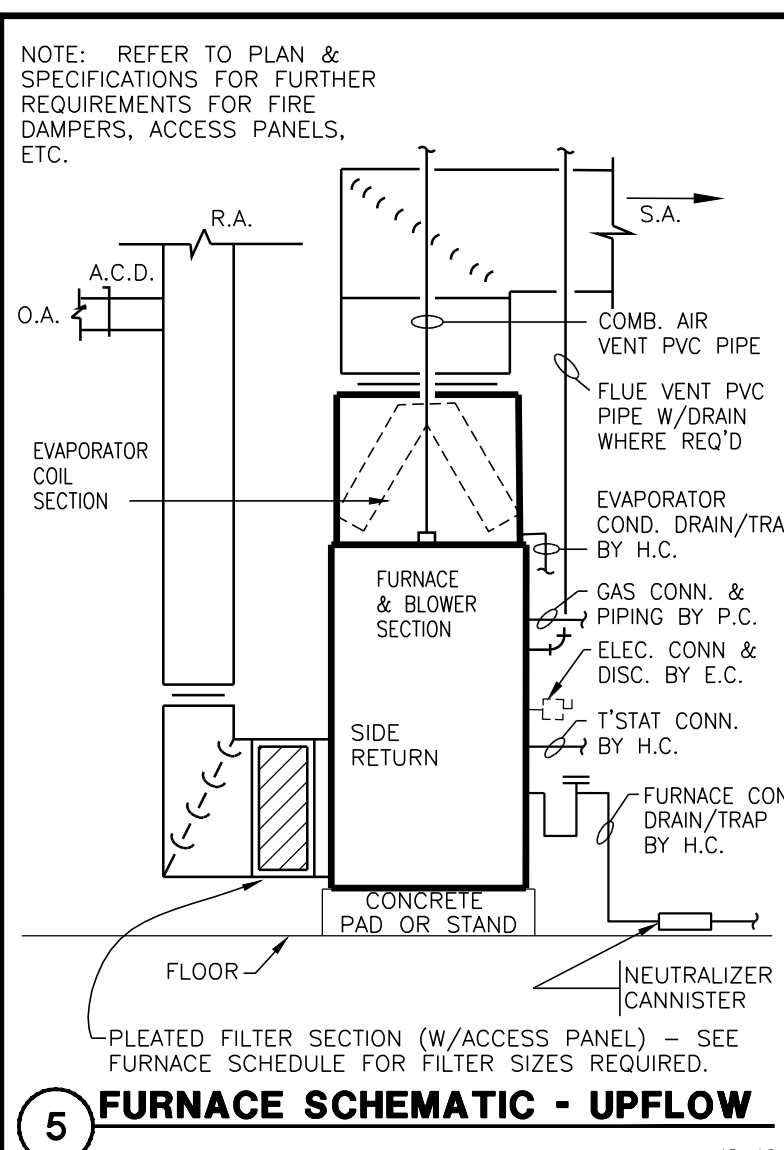
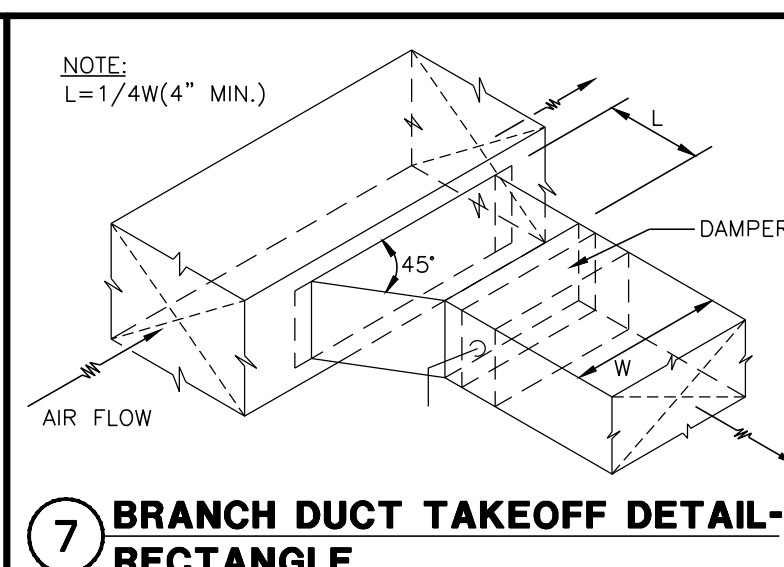
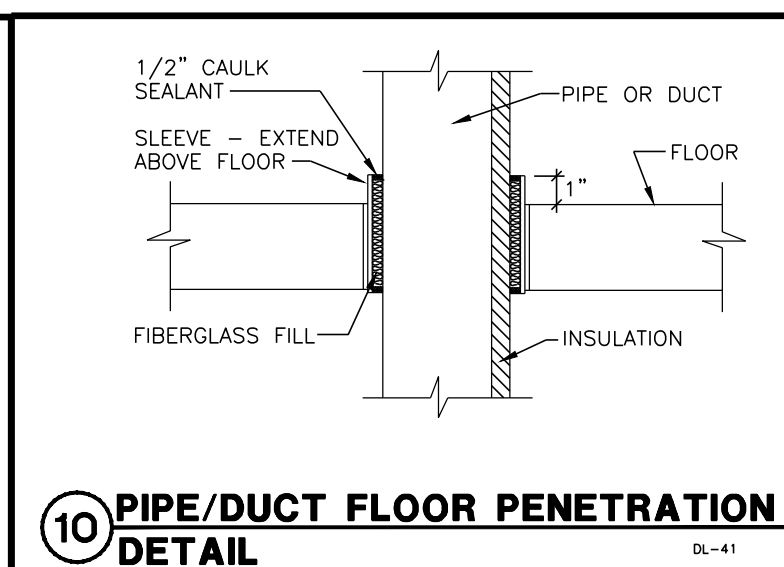
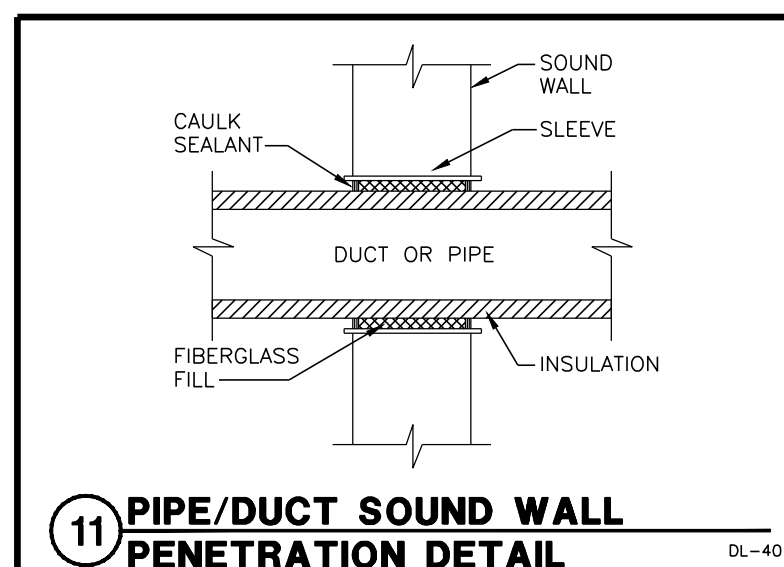
DIFFUSERS, REGISTERS AND GRILLES SCHEDULE							
TAG	MFR	MODEL	SIZE: NECK (WxH) FACE (L)	MOUNTING	SERVICE	CFM	REMARKS
S1	CARNES	RDBM	3 1/2"x36"	RND DUCT	SUPPLY	150-180	① 3 FT ALUM 2-WAY 2-SLOT (3/4") SD
S2	CARNES	CHCB	3 1/2"x48"	OVAL DUCT	SUPPLY	220	①④ 4 FT ALUM 2-WAY 2-SLOT (3/4") SD
R1	KEES	GHD40	12"x24"	WALL	RETURN	360	①② LOUVERED HD RR
R2	KEES	GHD40	24"x36"	WALL	RETURN	1500	①② LOUVERED HD RR
T1	CARNES	RALMH	16"x16"	SURFACE	TRANSFER	-	⑤ LOUVERED ALUM TG
T2	CARNES	RFJAD	20"x20"	DOOR	TRANSFER	-	⑤ FLANGED ALUM DG
E1	CARNES	RNJMH	8"x6"	CEILING	EXHAUST	100	①② LOUVERED ALUM. ER
E2	CARNES	RNJMH	12"x12"	CEILING	EXHAUST	250	①② LOUVERED ALUM. ER
E3	CARNES	RNJMH	16"x16"	CEILING	EXHAUST	600	①② LOUVERED ALUM. ER
CD = CEILING DIFFUSER SG = SUPPLY GRILLE RG = RETURN GRILLE SR = SUPPLY REGISTER RR = RETURN REGISTER ER = EXHAUST REGISTER SD = SLOT DIFFUSER HD = HEAVY DUTY							
REMARKS: ① WHITE FINISH. ② OPPOSED BLADE DAMPER. ③ ALUM. BAR GRILLE. ④ CONCEALED MOUNTING HARDWARE. ⑤ POWDER COAT ENAMEL PAINT FINISH COLOR-SELECTED BY ARCHITECT.							

HOT WATER BOILER SCHEDULE																
TAG	MANUFACTURER	MODEL NO.	TYPE	FUEL	INPUT MBH	OUTPUT MBH	EFF %	FLUE VENT SIZE	COMB AIR SIZE	WATER CONN.	COND. DRAIN CONN.	GAS CONN.	ELECTRICAL: LOW SERVICE	FLA	MOCP	REMARKS
B-1	IBC	HC 13-50	SEALED-COMBUSTION MODULATING	N. GAS	13.5-51	12.4-45.4	95	2"	2"	1"	3/4"	1/2"	115V/1Ø	2.3	15	①②③④⑤⑥⑦
① 30 PSIG PRESSURE RELIEF VALVE & HIGH-LIMIT AQUASTAT SUPPLIED WITH UNIT. ② BOILER PROVIDED WITH CONDENSATE TRAP & VENT CONNECTION KIT. ③ PROVIDE CONCENTRIC WALL VENT TERMINATIONS. ④ CPVC VENT PIPING; PVC COMBUSTION AIR PIPING. ⑤ WIRE OUTDOOR AMBIENT AND INDOOR SENSOR TO BOILER CONTROLLER. ⑥ WIRE HYDRONIC BUFFER TANK IMMERSION SENSOR TO BOILER CONTROLLER. ⑦ INTERNAL PRIMARY PUMP W/BOILER: UPS 15-58 RATED @ 9 GPM & 11 FT TDH.																

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

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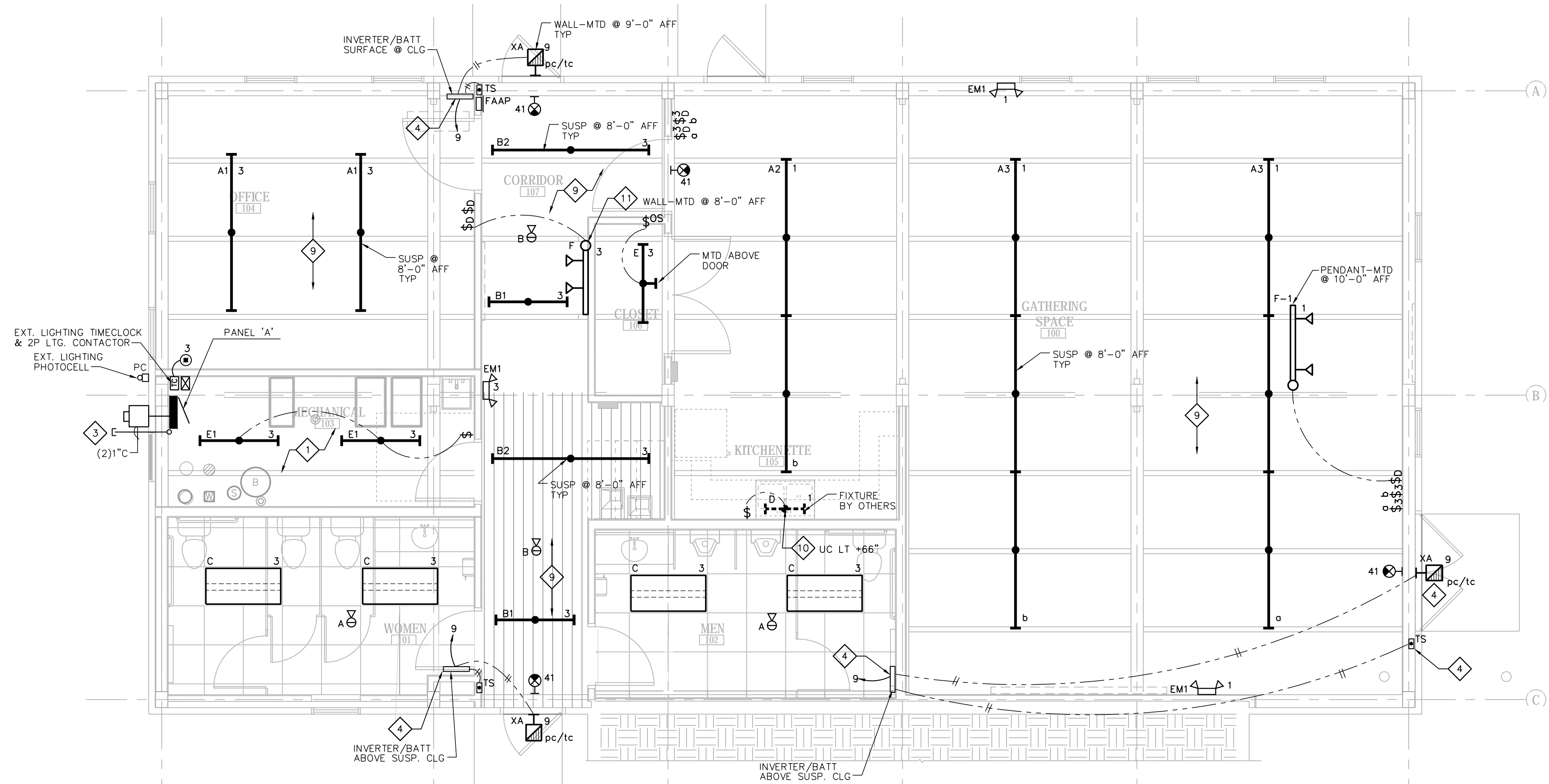
DATE OF ISSUE: 4-25-2017

REVISIONS:

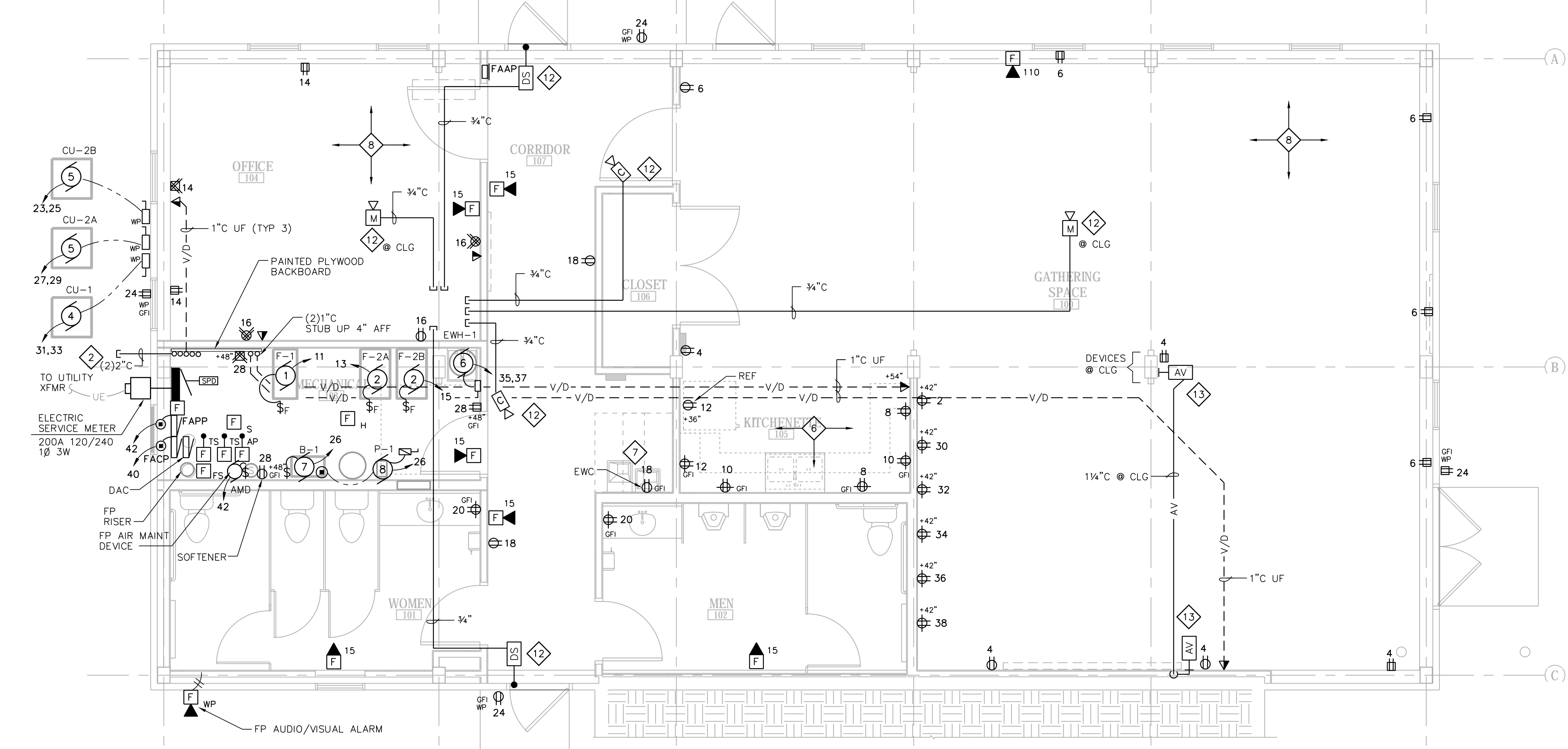
PROJECT # 14099

**HVAC
DETAILS**

H3.0



1 FLOOR PLAN - ELECTRICAL LIGHTING
1/4" = 1'-0"



2 FLOOR PLAN - ELECTRICAL POWER/LV
1/4" = 1'-0"

ELECTRICAL GENERAL NOTES:

- COORDINATE LIGHTING & DEVICE LAYOUT WITH GENERAL CONTRACTOR.
- COORDINATE ELECTRICAL RACEWAYS ROUTING WITH GENERAL CONTRACTOR AND OTHER TRADES FOR PROPER EQUIPMENT ACCESS.
- ALL RACEWAYS ARE TO BE CONCEALED IN FINISHED AREAS. MECHANICAL, UTILITY AND UNFINISHED EXISTING AREAS MAY USE SURFACE CONDUIT SYSTEMS.
- ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONSTRUCTION CONDITIONS.
- ALL LIGHTS CIRCUITED TO PANEL 'A' UNLESS INDICATED OTHERWISE.

ELECTRICAL PLAN NOTES:

- COORDINATE LIGHT FIXTURE MOUNTING LOCATION AND SUSPENSION HEIGHT WITH DUCTWORK, PIPING & OTHER TRADES.
- STUB OUT 2"(PVC) RACEWAY 24" BELOW GRADE AND CAPPED FOR FUTURE COMMUNICATIONS CABLING.
- STUB OUT 1"(PVC) RACEWAY 24" BELOW GRADE AND CAP FOR FUTURE EXTERIOR LIGHTS.
- INVERTER/BATTERY (25 VA) FOR EXTERIOR LIGHTING EMERGENCY EGRESS LIGHTING WITH REMOTE TEST SWITCH EQUAL TO DUAL LITE UFO-LED-25, + SPRTS. PROVIDE UNSWITCHED LEG TO INVERTER FOR POWER MONITORING.
- COORDINATE FINAL PLACEMENT OF FLOOR DEVICES WITH OWNER PRIOR TO INSTALLING.
- COORDINATE DEVICE PLACEMENT AT CASEWORK. CASEWORK BY OTHERS.
- COORDINATE FINAL RECEPTACLE LOCATION FOR ELECTRIC WATER COOLER ROUGH-IN WITH PLUMBING CONTRACTOR.
- ROUTE LIGHTING CONDUCTORS THROUGH EXPOSED EMT CONDUIT SURFACE-MTD AT EXISTING WALLS.
- SUPPORT PENDANT FIXTURES FROM CABLE MTD CANOPY/BOX FLUSH WITH EXISTING CEILING. ROUTE CONDUIT/RACEWAY SYSTEM IN SECOND LEVEL INSULATED FLOOR.
- UNDERCOUNTER LIGHT WITH CASEWORK INSTALLATION BY OTHERS. PROVIDE SWITCH AND ROUGH-IN FOR LIGHT FIXTURE.
- WALL-MTD TRACK FIXTURE @ 8'-0" AFF.
- PROVIDE JCT BOX (4"x4"x2") AND RACEWAY SYSTEM FOR FUTURE SECURITY CAMERAS, MOTION DETECTORS & ELECTRIC DOOR STRIKES BY OTHERS.
- PROVIDE JCT BOX (4"x4"x2") AND RACEWAY SYSTEM FOR AUDIO/VISUAL CABLING BY OTHERS.

DIMMER TYPES:

- A 0-10 VDC LED DRIVERS; SYNERGY ISD-BC-120/277-WH (A1, A2 & A3 FIXTURES)
- B LV 120 VAC LED; SYNERGY ISD-400-ELV-120/277-WH (F & F1 FIXTURES)

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

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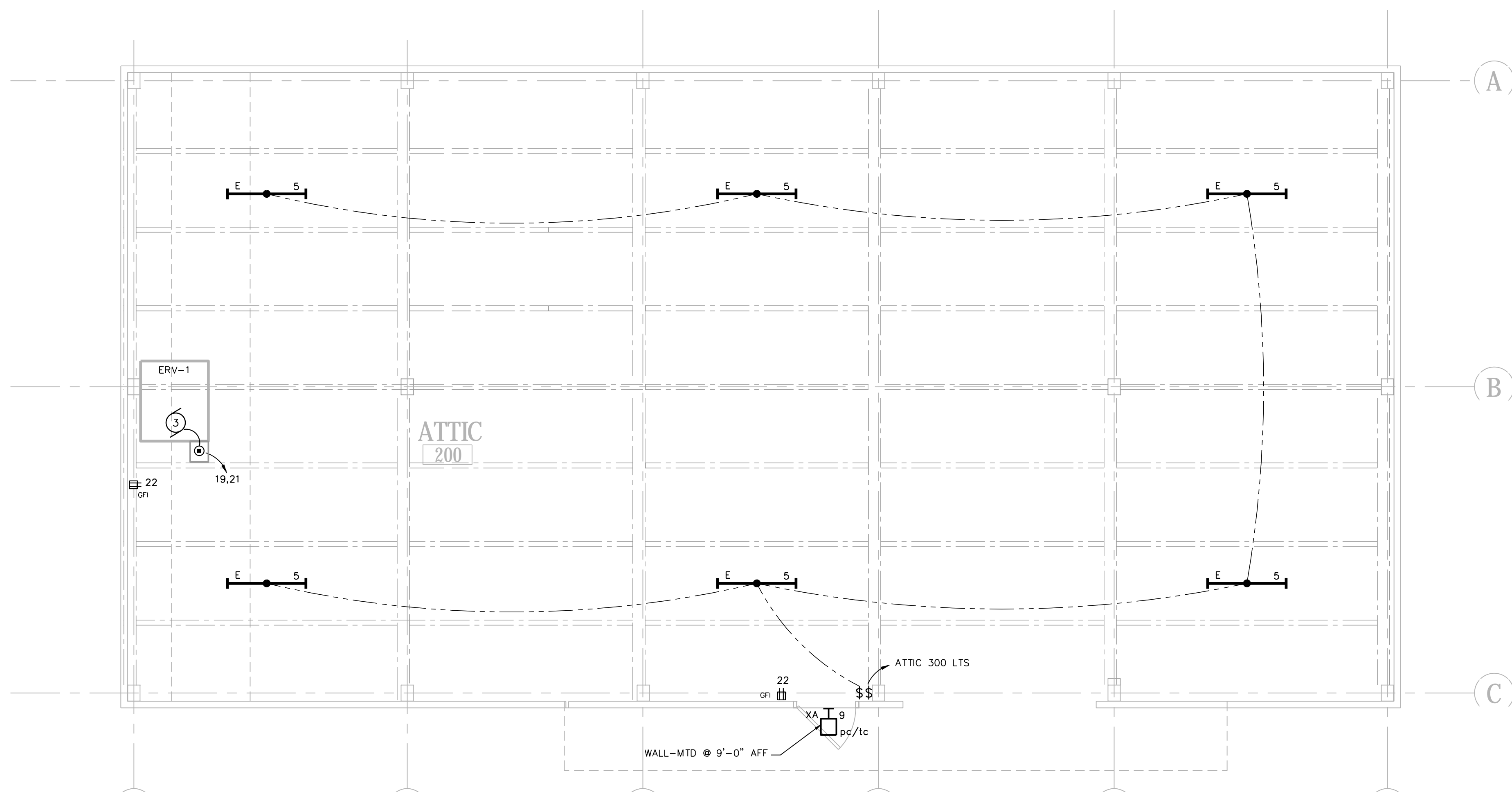
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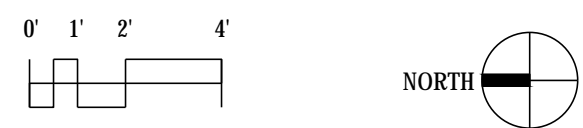
PROJECT # 14099

**GROUND
FLOOR PLANS -
ELECTRICAL**

E1.1



1 LOWER ATTIC PLAN - ELECTRICAL
1/4" = 1'-0"



ELECTRICAL GENERAL NOTES:

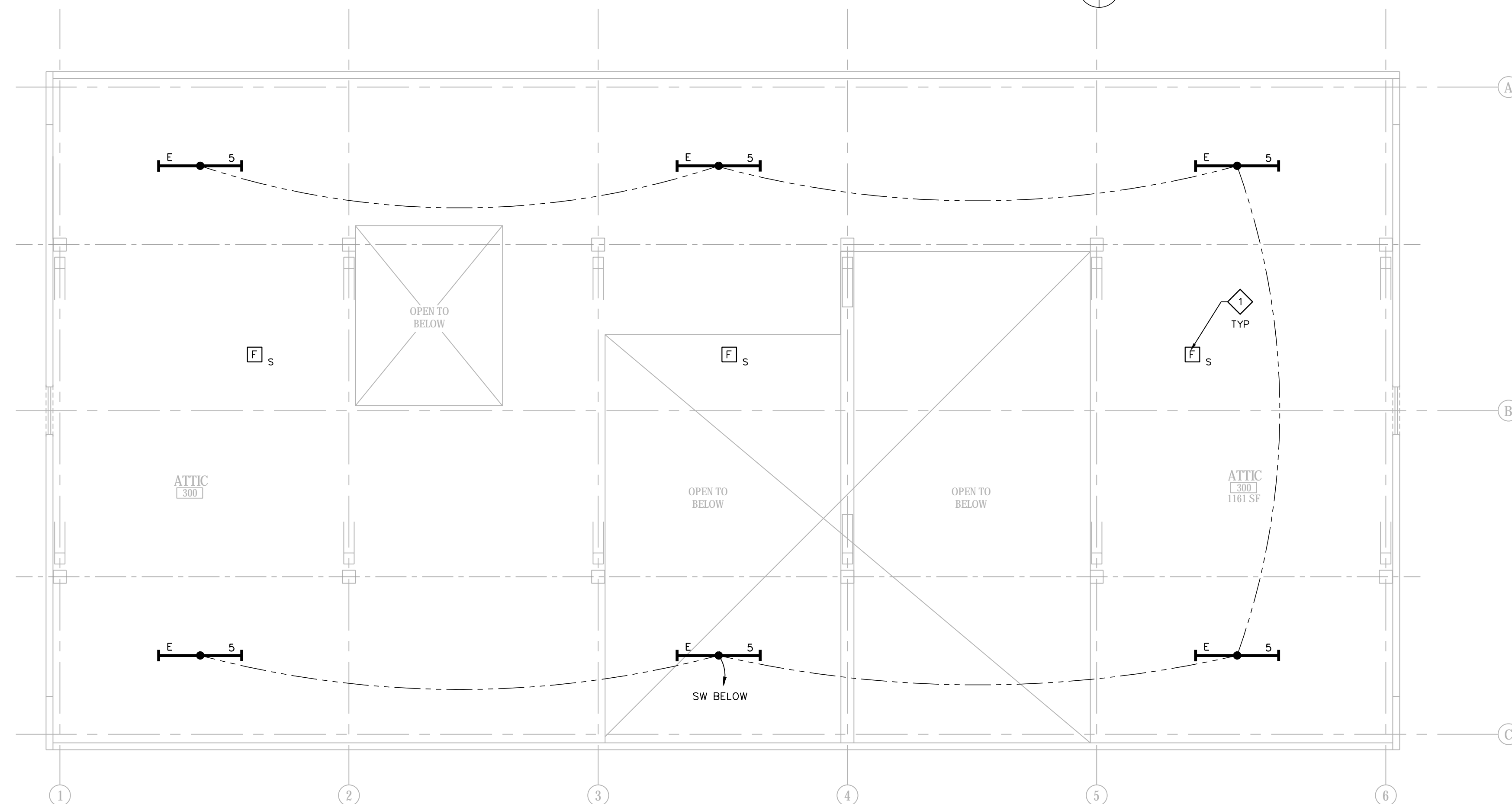
1. COORDINATE LIGHTING & DEVICE LAYOUT WITH GENERAL CONTRACTOR.
2. COORDINATE ELECTRICAL RACEWAYS ROUTING WITH GENERAL CONTRACTOR AND OTHER TRADES FOR PROPER EQUIPMENT ACCESS.
3. ALL RACEWAYS ARE TO BE CONCEALED IN FINISHED AREAS. MECHANICAL, UTILITY AND UNFINISHED EXISTING AREAS MAY USE SURFACE CONDUIT SYSTEMS.
4. EXISTING ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL CONSTRUCTION CONDITIONS.
5. ALL LIGHTS CIRCUITED TO PANEL 'A' UNLESS INDICATED OTHERWISE.

ELECTRICAL PLAN NOTES:

- ◇ EXTEND FIRE ALARM SYSTEM DEVICES TO GROUND FLOOR FIRE ALARM SYSTEM.

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

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1 UPPER ATTIC PLAN - ELECTRICAL
1/4" = 1'-0"



DATE OF ISSUE: 4-25-2017

REVISIONS:

PROJECT # 14099

**ATTIC FLOOR PLANS -
ELECTRICAL**



SCHUMACHER BARN REMODEL/SITE IMPROVEMENTS

5682 State Hwy 19
Westport, WI 53597

DATE OF ISSUE: 4-25-2017

REVISIONS:

PROJECT # 14099

ELECTRICAL SCHEDULES

E2.0

LIGHTING FIXTURE SCHEDULE							
TAG	NO.	TYPE	WATTS	DESCRIPTION	MOUNTING	MFGR. & MODEL	REMARKS
A1	-	LED	88	W/FIXTURE	PENDANT/ CABLE	PEERLESS - BRM9L-LCB-8FT-MSL8-80CRI-40K-ID1300LMF- 50/50-ZT-120-SCT-F2/48A-C110	(1)(2)(3) 8FT LED DIRECT/INDIRECT PENDANT DIM. 9000L, 40K
A2	-	LED	176	W/FIXTURE	PENDANT/ CABLE	PEERLESS - BRM9L-LCB-16FT-MSL8-80CRI-40K-ID1300LMF- 50/50-ZT-120-SCT-F2/48A-C110	(1)(2)(3) 16FT LED DIRECT/INDIRECT PENDANT DIM. 18000L, 40K
A3	-	LED	264	W/FIXTURE	PENDANT/ CABLE	PEERLESS - BRM9L-LCB-24FT-MSL12-80CRI-40K-ID1300LMF- 50/50-ZT-120-SCT-F2/72A-C110	(1)(2)(3) 24FT LED DIRECT/INDIRECT PENDANT DIM. 27000L, 40K
B1	-	LED	31	W/FIXTURE	PENDANT/ CABLE	PEERLESS - BRM9L-LCB-4FT-MSL4-80CRI-40K-ID1000LMF- 50/50-ZT-120-SCT-F2/48A-C110	(1)(2)(3) 4FT LED DIRECT/INDIRECT PENDANT DIM. 3200L, 40K
B2	-	LED	62	W/FIXTURE	PENDANT/ CABLE	PEERLESS - BRM9L-LCB-8FT-MSL8-80CRI-40K-ID1000LMF- 50/50-ZT-120-SCT-F2/48A-C110	(1)(2)(3) 8FT LED DIRECT/INDIRECT PENDANT DIM. 6400L, 40K
C	-	LED	52	W/FIXTURE	RECESSED/ T-BAR CLG	LITHONIA - ZV1L4-60L-ADP-EZ1-LP840	(1)(2) 2x4 LED VOLUMETRIC TROFFER DIM. 6000L, 40K
D	-	LED	-	-	SURFACE/ UC	FURNISHED AND INSTALLED BY OTHERS	
E	-	LED	42	W/FIXTURE	SURFACE	LITHONIA - ZL10-L48-5000LM-FST-MVLT-40K-80CRI-WH	(1) 4FT LED UTILITY LIGHT 5000L, 40K
E1	-	LED	42	W/FIXTURE	SUSPENDED/ CABLE	LITHONIA - ZL10-L48-5000LM-FST-MVLT-40K-80CRI-WH-2ACVH	(1)(8) 4FT LED UTILITY LIGHT 5000L, 40K CABLE-HUNG
F	-	LED	18	W/FIXTURE	TRACK	JUNO - 1254L-40K-N-WH (HEAD) + T4WH (TRACK) + T2WH (FEED)	(1) TRACK LIGHTS + 4FT TRACK
F1	-	LED	18	W/FIXTURE	PENDANT/ TRACK	JUNO - 1254L-40K-N-WH (HEAD) + T4WH (TRACK) + T4WH (PENDANTS)	(1) TRACK LIGHTS + 4FT TRACK + PENDANT 1400L, 40K
XA	-	LED	13	W/FIXTURE	WALL/ SURFACE	LURALINE - RS16-GNA22X-L13LMH-40K	(1)(5) 16"x30" DECORATIVE WALL RLM 1250L, 40K
XB	-	LED	91	W/FIXTURE	POLE-MTD W/CONC. BASE	LITHONIA - DSX1 LED-40C-700-40K- T3M-MVLT-RPA-PIRH-HS-DBXKD + RSA 20-4.5C-DM19-DOB (20 FT POLE)	(1)(5) EXT. AREA LIGHT, 20 FT POLE 10,900L, 40K HI/LO DIM
EM1	2	LED	5.4	W/FIXTURE	SURFACE	LITHONIA - ELM6 LED-W-LP0.3VS	(1)(6) EMERGENCY EGRESS LIGHT W/BATTERY BACK-UP (50'FT COVERAGE)
ⓧ	-	LED	1	W/UNIT	SURFACE/ WALL	LITHONIA - LOM-S-W-3-G 120/277 ELN	(1)(4)(6) EXIT LIGHT W/BATTERY BACK-UP

LAMP ABBREVIATIONS:
LED=LIGHT EMITTING DIODE
F=FLUORESCENT
CF=COMPACT FLUORESCENT
TH=TUNGSTEN HALOGEN
IN=INCANDESCENT
MH=METAL HALIDE

REMARKS:
(1) LED LAMPING.
(2) DIMMING LED DRIVER (0-10VDC): EQUAL SYNERGY ISD-BC-120/277-WH.
(3) CONTRACTOR TO INSTALL PENDANT FIXTURE WITH CABLE SUPPORTS & POWER FEED AS CONFIGURED ON DRAWINGS WITH REQUIRED FITTINGS.
(4) CONTRACTOR TO PROVIDE SINGLE OR DOUBLE PANEL EXIT FACE AS REQ'D. AND MOUNT FIXTURE AS INDICATED ON DWGS.
(5) WET-LOC. UL LISTED.
(6) BATTERY BACKUP EMERGENCY LIGHTING.
(7) FINAL FINISH COLORS TO BE SELECTED BY ARCHITECT FROM STD FIXTURE COLORS AVAILABLE.
(8) PROVIDE CABLE SUSPENSION & FEED SUPPORTS.
(9) EXTERIOR FIXTURES 'XA', WHERE INDICATED, PROVIDED WITH BATTERY BACKUP POWER FOR EMERGENCY LIGHTING THROUGH INVERTER (25VA) EQUAL TO DUAL LITE UFO-LED25 WITH REMOVE TEST SWITCH SPRTS.
(10) VERIFY FINAL FIXTURE MOUNTING HEIGHT WITH ARCHITECT/OWNER.
(11) PROVIDE TRACK, TRACK HEADS AND ACCESSORIES AS REQUIRED TO PROVIDE CONFIGURATION ON DRAWINGS.
(12) DIMMING LED DRIVER (LV 120VAC): SYNERGY ISD-400-ELV-120/277-WH.
(13) FIXTURE MOUNTED INTEGRAL OCCUPANCY SENSOR SWITCH FOR HIGH/LOW DIMMING CONTROL.

ALL FIXTURE VOLTAGES ARE 120 VOLT UNLESS INDICATED OTHERWISE.

OCCUPANCY SENSOR SCHEDULE							
SYMBOL	MOUNTING	VOLTAGE	RATED CURRENT	SENSOR TYPE	COVERAGE	MFGR. & MODEL	REMARKS
ⓧA	RECESSED/ CLG	24 VAC	16 mA	DT	360° 24"x24"	SENSOR SWITCH RM-PDT-9	(1) RECESSED CLG DT - LOW VOLTAGE
ⓧB	RECESSED/ CLG	120 VAC	800 Watt	DT	360° 24"x24"	SENSOR SWITCH CMR-PDT-9	SURFACE CLG DT - LINE VOLTAGE
ⓧS	WALL SWITCH	120 VAC	800 Watt	DT	160° 20"	SENSOR SWITCH WSD-PDT	WALL SWITCH

ABBREVIATIONS:
PIR=PASSIVE INFRARED
U=ULTRASONIC
DT=DUAL TECHNOLOGY (PIR+U)

REMARKS:
(1) SENSOR SWITCH PP-20 POWER PACK SW RATED: 20 AMPS 120/277 VOLTAGE OUTPUT = mA 15VDC.

ELECTRICAL MOTOR/EQUIPMENT SCHEDULE									
TAG	①	②	③	④	⑤	⑥	⑦	⑧	⑨
PANEL NO.	A	A	A	A	A	A	A	A	A
CIRCUIT	11	13,15	19,21	31,33	23,25 & 27,29	35,37	26	26	
BREAKER	④	15	20	25	30	30	20	20	
POLE	1	1	2	2	2	2	1	1	
WIRING NO.	①	2+G (#12)	2+G (#12)	2+G (#10)	2+G (#12)	2+G (#10)	2+G (#10)	2+G (#12)	2+G (#12)
TYPE	THHN/CU	THHN/CU	THHN/CU	THHN/CU	THHN/CU	THHN/CU	THHN/CU	THHN/CU	THHN/CU
SIZE	#12	#12	#10	#12	#10	#10	#12	#12	
COND.	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	
ELECTRICAL HP (KW)	1/2	3/4	2 @ 1-1/2	(2.2)	(3.5)	(4.5)	FRAC HP	FRAC HP	
VOLT	115	115	230	230	230	240	115	115	
PHASE	1	1	1	1	1	1	1	1	
FLA (MCA)	7.5 (10.3)	10.7 (14.3)	9.6 (19.2)	9.5 (11.8)	15.3 (21.5)	18.8 (23.5)	2.3 (2.9)	0.7 (0.80)	
STARTER TYPE	W/UNIT	W/UNIT	w/UNIT	w/UNIT	w/UNIT	w/UNIT	BOILER CONTROL PANEL	BOILER CONTROL PANEL	
SIZE	-	-	-	-	-	-	-	-	
BY	H.C.	H.C.	H.C.	H.C.	H.C.	P.C.	H.C.	H.C.	
CONTROL TYPE	STAT	STAT	OCCUPIED CONTROL	STAT	STAT	w/UNIT	MANUAL	BOILER CTRL	
BY	H.C.	H.C.	H.C.	H.C.	H.C.	P.C.	H.C.	H.C.	
DISCONNECT TYPE	F.T.S.	F.T.S.	W/UNIT	NEMA 3R HD	NEMA 3R HD	NEMA 1	T.S.	M.S.	
SIZE	15	15	-	30	30	30	15	15	
FUSE	③	15	15	-	-	-	-	T.U.	
BY	E.C.	E.C.	H.C.	E.C.	E.C.	E.C.	E.C.	E.C.	
REMARKS	FURNACE F-1	FURNACE F-2A & 2B	ENERGY RECOVERY UNIT ERV-1	COND. UNIT CU-1	COND. UNIT CU-2A & 2B	ELECTRIC WTR HTR EWH-1	BOILER B-1	RADIANT PUMP P-1	

E.C. = ELECTRICAL CONTRACTOR
H.C. = HVAC CONTRACTOR
P.C. = PLUMBING CONTRACTOR
G.C. = GENERAL CONTRACTOR

N.R. = NOT REQUIRED
G.D. = GENERAL DUTY
H.D. = HEAVY DUTY

H.D. = HEAVY DUTY
T.S. = TOGGLE SWITCH
F.T.S. = FUSED TOGGLE SWITCH
M.S. = MANUAL STARTER (FRAC HP)
T.U. = THERMAL UNIT

MAG = MAGNETIC STARTER
FVNR = FULL VOLTAGE NON-REVERSING
P.L. = PILOT LIGHT
H.D.A. = HAND-OFF-AUTO SWITCH
N.R. = NOT REQUIRED

① PROVIDE GREEN WIRE GROUND TO ALL MOTORS AND EQUIPMENT PER NEC 250-95.
② COORDINATE FINAL HVAC EQUIPMENT LOCATIONS & WIRING REQUIREMENTS WITH HVAC CONTRACTOR.
③ ELECTRIC WATER HEATER WITH PLUMBING CONTRACTOR.

PANEL 'A' AIC = 22K										
AMPS MAIN			VOLTS PHASE			MOUNTING LOCATION			SURFACE MECH	
200			120/240			SURFACE			103	
BRKR	A	P	DESCRIPTION	CIRCUIT	PHASELOADS	CIRCUIT	DESCRIPTION	BRKR	A	P
				WATT	NO. A B	NO. WATT				
20	1		LIGHTS 100	870	1 2070	2 1200	RECEPT 100	20	1	
20	1		LIGHTS 101-108 + TC	700	3 1420	4 720	RECEPT 100	20	1	
20	1		LIGHTS ATTIC 200/300	500	5 1580	6 1080	RECEPT 100	20	1	
20	1		SPARE	0	7 1500	8 1500	RECEPT 105	20	1	
20	1		EXTERIOR + AREA LIGHTS	260	9 1760	10 1500	RECEPT 105	20	1	
15	1		FURNACE F-1	860	11 1860	12 1000	RECEPT 105	20	1	
20	1		FURNACE F-2A	1230	13 1950	14 720	RECEPT 104	20	1	
20	1		FURNACE F-2B	1230	15 2130	16 900	RECEPT 104	20	1	
20	1		SPARE	0	17 860	18 860	RECEPT 107,108	20	1	
25	2		ERV-1	1150	19 1510	20 360	RECEPT 101,102	20	1	
-	-		ERV-1	1150	21 1510	22 360	RECEPT ATTIC 200	20	1	
20	2		CU-2B	1090	23 1810	24 720	RECEPT EXTERIOR	20	1	
-	-		CU-2B	1090	25 1450	26 360	BOILER B-1 + PUMP P-1	20	1	
30	2		CU-2A	1760	27 2480	28 720	RECEPT 103	20	1	
-	-		CU-2A	1760	29 2960	30 1200	RECEPT 100	20	1	
30	2		CU-1	1760	31 2960	32 1200	RECEPT 100	20	1	
-	-		CU-1	1760	33 2960	34 1200	RECEPT 100	20	1	
30	2		EWH-1 ELECT WTR HTR	2250	35 3450	36 1200	RECEPT 100	20	1	
-	-		EWH-1 ELECT WTR HTR	2250	37 3450	38 1200	RECEPT 100	20	1	
-	-			39	500 40	500	FIRE ALARM CONTROL PNL	20	1	
20	1		EXIT LIGHTS	50	41 1550	42 1500	FIRE ALARM POWER PNL + AMD	20	1	

ESTIMATED DEMAND LOAD: 36,900 WATTS / 153.8 AMPS

TOTAL CONNECTED LOADS: 41,720 WATTS / 173.8 AMPS

* LOCKABLE RED CB

ELECTRICAL SYMBOL SCHEDULE					
MOUNTING HGT.	SYMBOL	DESCRIPTION	MOUNTING HGT.	SYMBOL	DESCRIPTION
		EQUIPMENT AND WIRING			LIGHTING FIXTURES
		DIRECT EQUIPMENT CONNECTION		PANEL/CIRC.#	LED: SURFACE/ PENDANT
		MOTOR CONNECTION-SEE EQUIP. SCHEDULE FOR TYPE, WIRING, ETC.		TYPE SWITCHING	LED: RECESSED W/BATTERY BACKUP
		JUNCTION BOX-CONCEALED IN FINISHED AREAS, SURFACE IN UNFINISHED AREAS			LED: SURFACE WALL MOUNTED
		COMBINATION STARTER/DISCONNECT			LED: SURFACE WALL-MTD W/BATTERY BACKUP
		SAFETY DISCONNECT SWITCH WITH COVER INTERLOCK-W.P. INDICATES WATERPROOF (NON-FUSED UNLESS INDICATED BY 'F'-FUSED)			LED: RECESSED WALL MOUNTED
		MANUAL STARTER			LED: RECESSED
		STARTER			LED: SURFACE, CEILING MOUNTED
		ELECTRICAL POWER PANEL			LED: SURFACE, WALL MOUNTED
		DOUBLE TUB ELECTRICAL POWER PANEL			EXIT LIGHT: ARROWS, FACES & MOUNTING AS SHOWN ON DRAWINGS
18"		RECEPTACLES			EMERGENCY LIGHT W/ BATTERY PACK: WALL MOUNTED
		DUPLEX: RECESSED - W.P. INDICATES WATERPROOF			TRACK LIGHTING
18"		DUPLEX: SURFACE	48"		SWITCHES
		TWO DUPLEX RECEPTS. IN TWO GANG BOX	48"	\$	SINGLE POLE
18"		TWO DUPLEX RECEPTS. SURFACE MTD IN TWO GANG BOX	48"	\$3	THREE WAY
		DUPLEX: W/GROUND FAULT INTERRUPTION PROTECTION	48"	\$4	FOUR WAY
		FLUSH FLOOR BOX WITH DUPLEX RECEPTACLE	48"	\$Ⓢ	SWITCH AND DUPLEX RECEPTACLE IN TWO GANG BOX
		CEILING MOUNTED DUPLEX RECEPTACLE	48"	\$F	FUSED TOGGLE SWITCH
		FLUSH FLOOR BOX W/ RECEPTACLES & LV OUTLETS	48"	\$SC	SPEED CONTROLLER SWITCH SUPPLIED BY H.C. INSTALLED BY E.C.
		DUPLEX RECEPT. MOUNTED ABOVE CASEWORK BACKFLASH	48"	\$D	DIMMING SWITCH
		DUPLEX RECEPT. MOUNTED IN CABINET FACE	48"	\$P	SWITCH WITH PILOT LIGHT
18"		250V, 2P, 3W SINGLE RECEPT. - AMPS AS SHOWN ON DWGS	48"	\$OS	OCCUPANCY SENSOR CONTROLLED WALL SWITCH
		SINGLE RECEPTACLE	48"	\$T	ELECTRONIC TIMER SWITCH
		TELEPHONE AND COMMUNICATION SYSTEMS	48"		OCCUPANCY SENSOR CEILING MTD. - TYPE AS SCHEDULED
18"		DATA OUTLET			FIRE ALARM SYSTEMS
18"		TELEPHONE OUTLET	90"		FIRE ALARM MANUAL FILL
		VOICE/DATA OUTLET	90"		FIRE ALARM HORN/VISUAL STROBE CEILING MTD
		VOICE/DATA OUTLET MTD ABOVE CASEWORK BACKFLASH	90"		FIRE ALARM HORN/VISUAL STROBE CANDELA-ILLUMINATION LEVEL
		DATA OUTLET FLUSH FLOOR MOUNTED	90"		FIRE ALARM STROBE
		WIRELESS ACCESS POINT (DATA)	90"		FIRE ALARM HORN
		AUDIO/VIDEO OUTLET	90"		FIRE ALARM SMOKE DETECTOR- CLG. MTD.
		SECURITY SYSTEM	90"		FIRE ALARM HEAT DETECTOR CLG. MTD
		MOTION DETECTORS	90"		FIRE ALARM - DOOR HOLDER RELEASE
		CAMERA	90"		FIRE ALARM SPRINKLER TAMPER SWITCH
		DOOR STRIKE	90"		FIRE ALARM SPRINKLER FLOW SWITCH
			90"		FIRE ALARM SPRINKLER AIR PRESSURE SWITCH
			90"		FIRE ALARM DUCT SMOKE DETECTOR
			90"		FIRE ALARM - MONITOR MODULE
			90"		FIRE ALARM CONTROL MODULE
48"			48"		FIRE ALARM NOTIFICATION APPLIANCE CIRCUIT POWER PANEL
48"			48"		FIRE ALARM DIGITAL COMMUNICATOR
48"			48"		FIRE ALARM ANNUNCIATOR PANEL
48"			48"		FIRE ALARM CONTROL PANEL
48"			48"		FIRE ALARM POWER PANEL
					FIRE ALARM AIR MAINTENANCE DEVICE (AIR COMPRESSOR)

ABBREVIATIONS
SUBSCRIPTS:
AFF=ABOVE FINISH FLOOR
GFI=GROUND FAULT INTERRUPTER
NL=NIght LIGHT-24 HOURS
PC=PHOTOCELL CONTROLLED
PC/TC=PHOTOCELL TIME CLOCK CONTROLLED
TC=TIME CLOCK CONTROLLED
WP=WEATHERPROOF

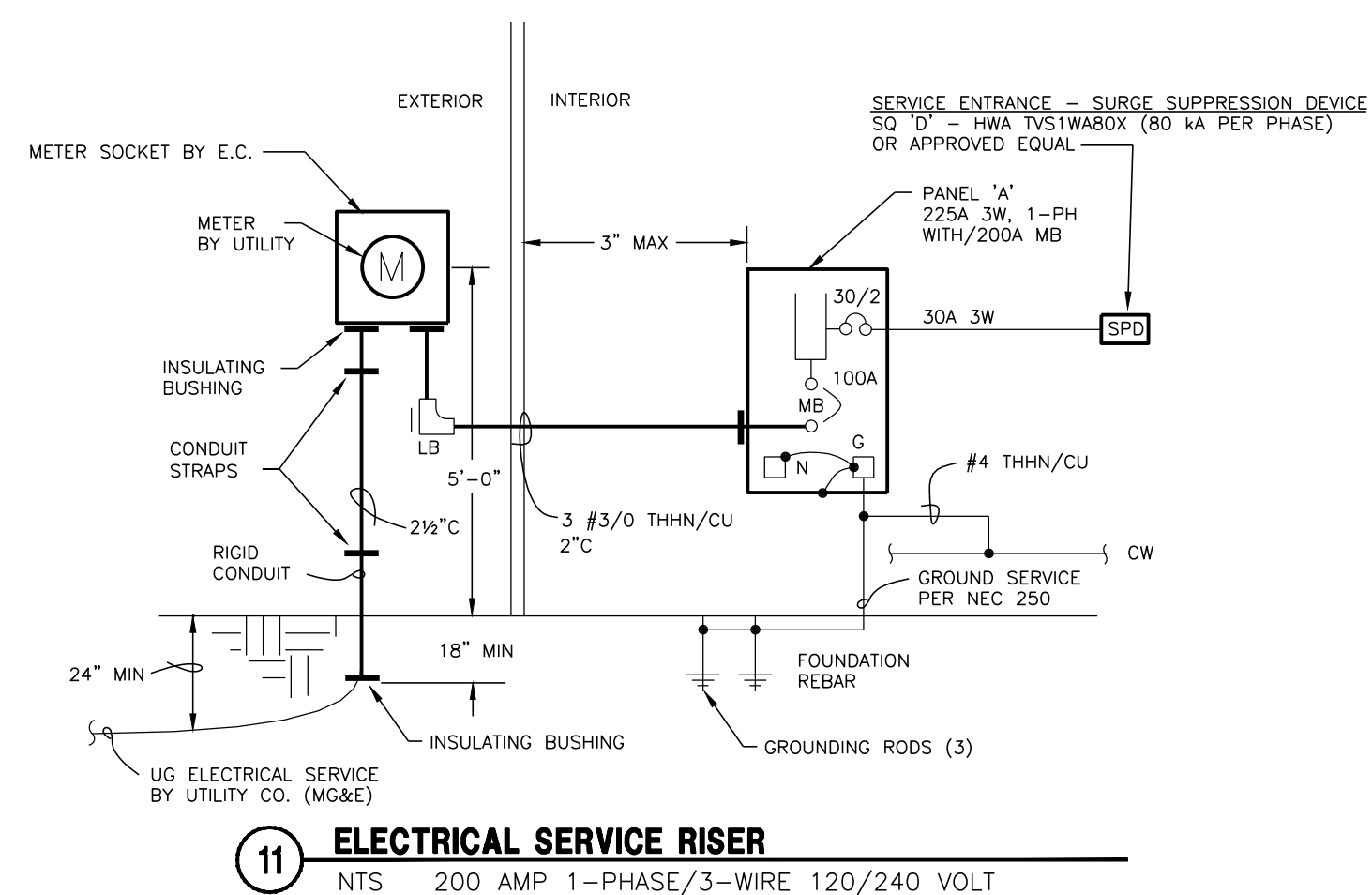
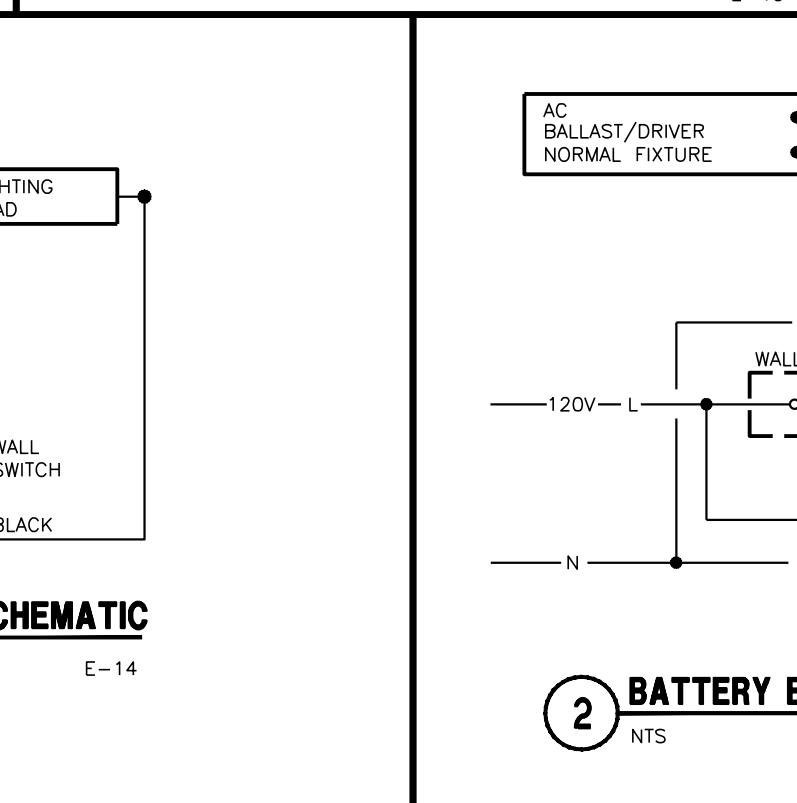
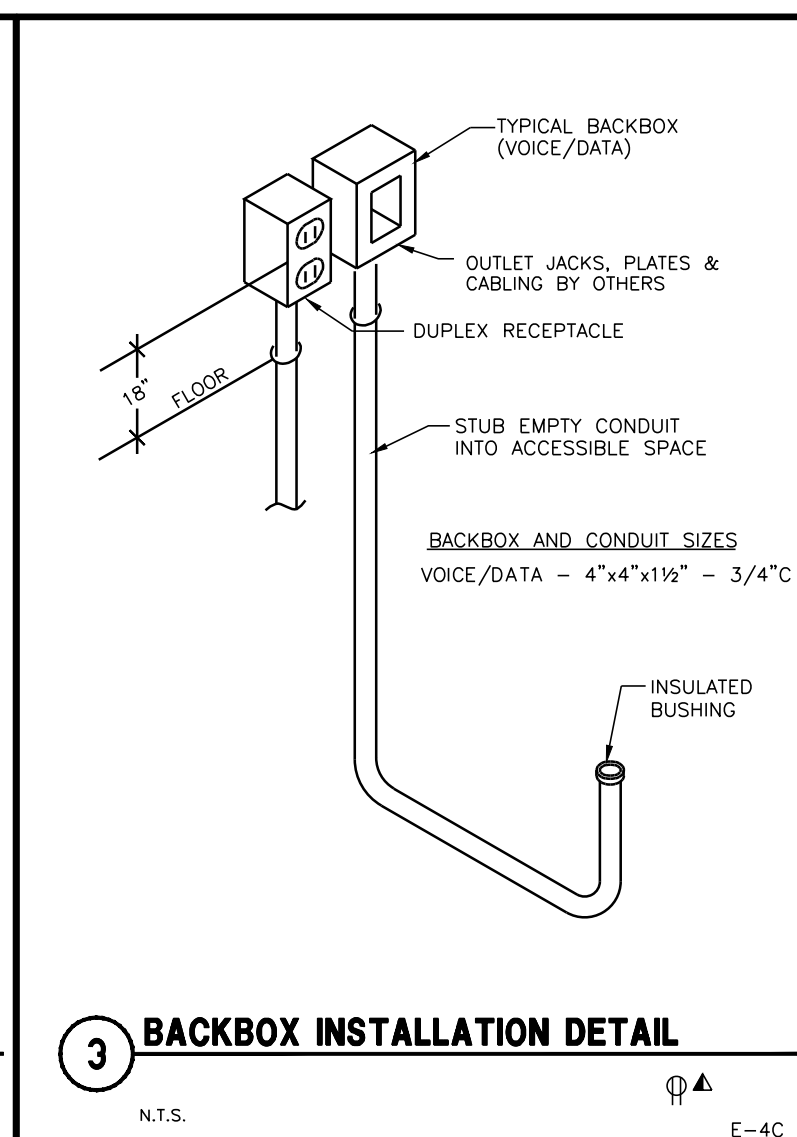
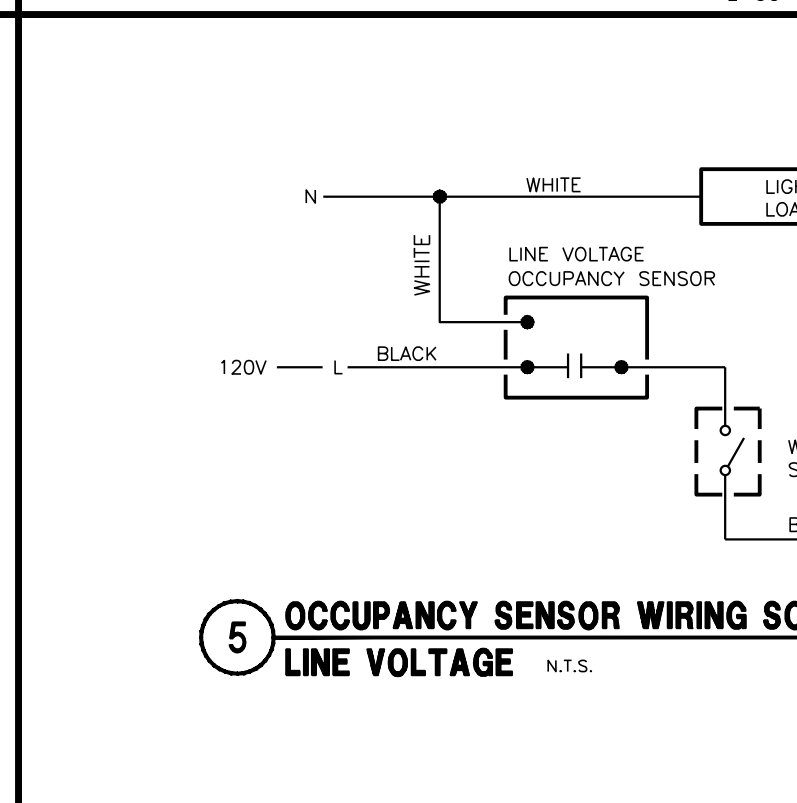
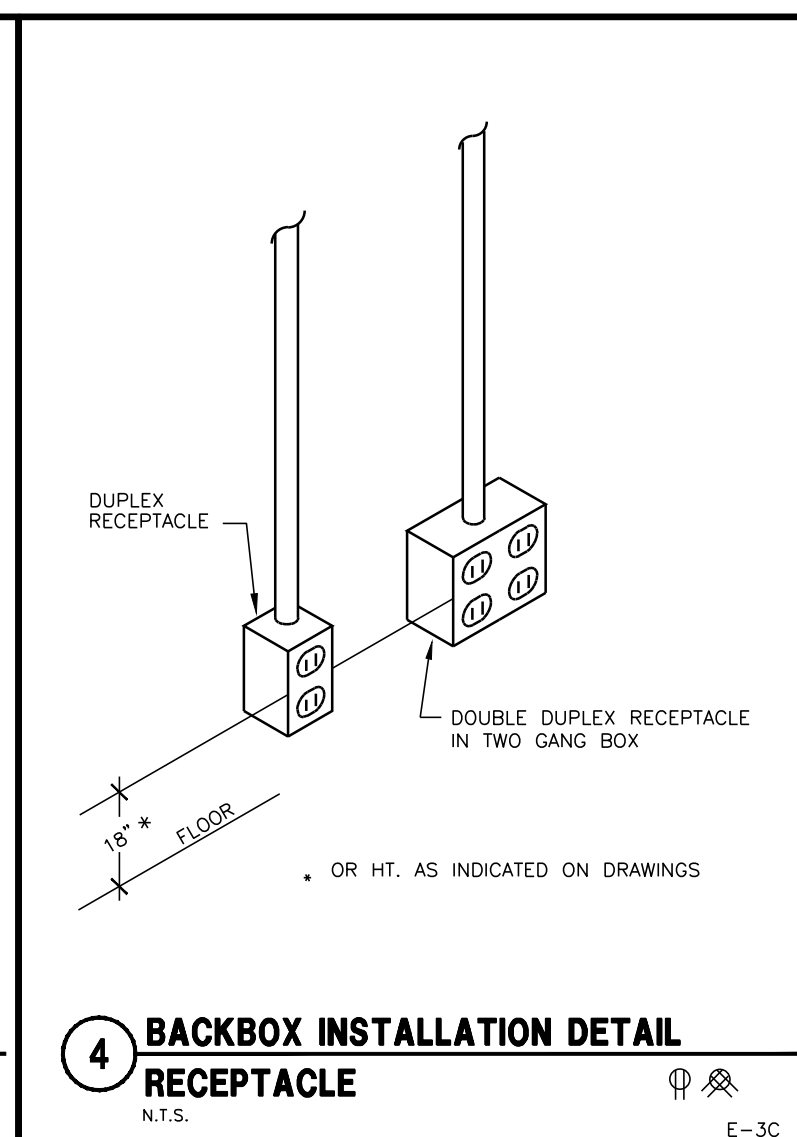
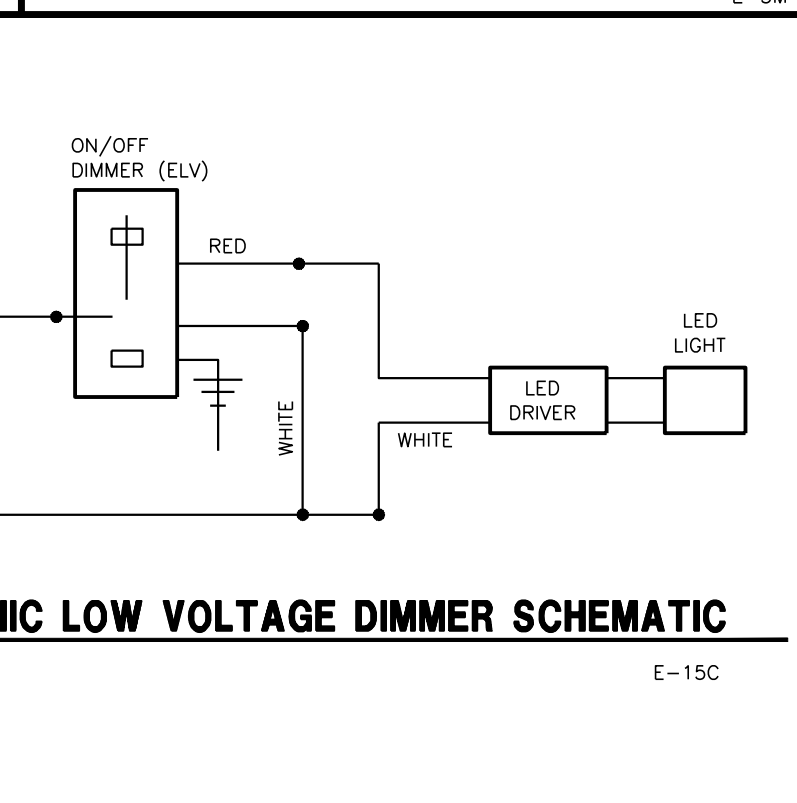
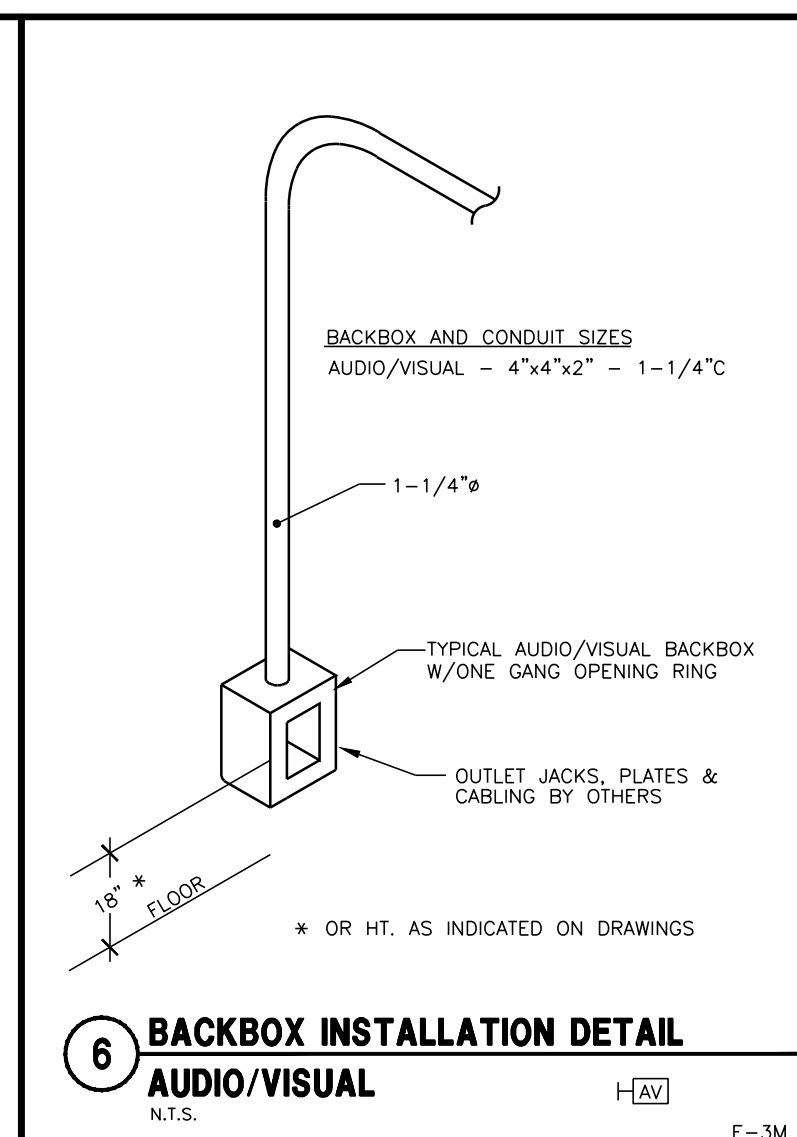
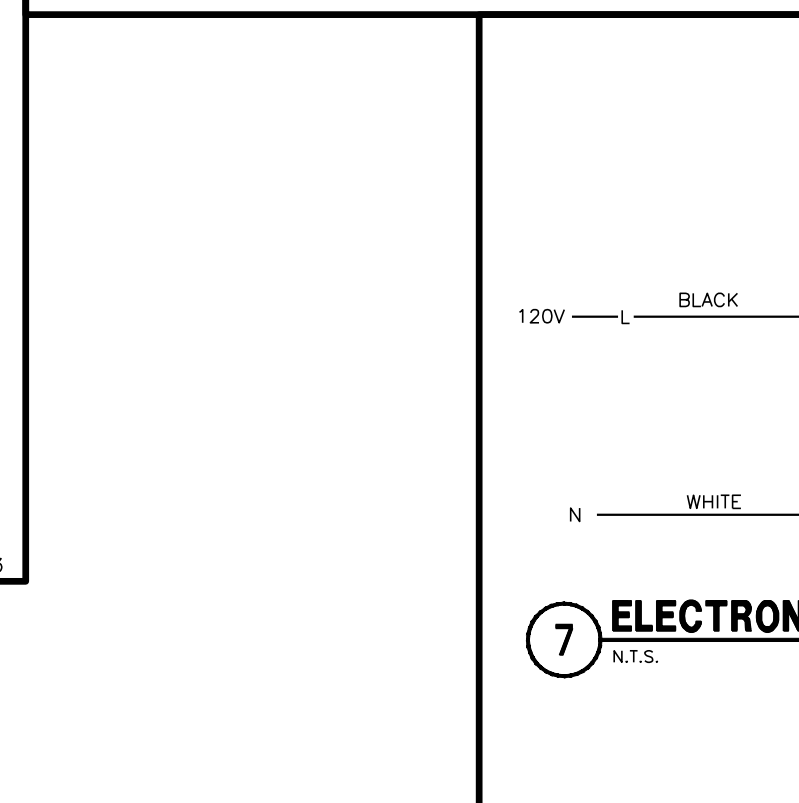
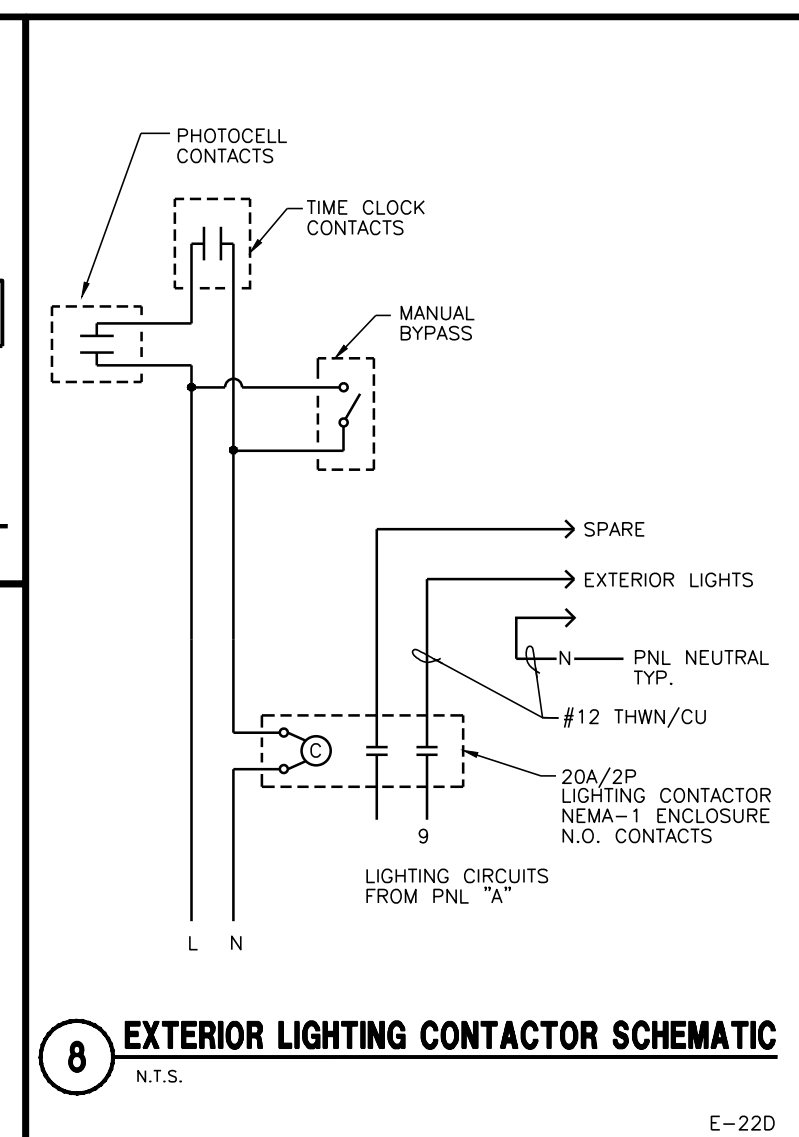
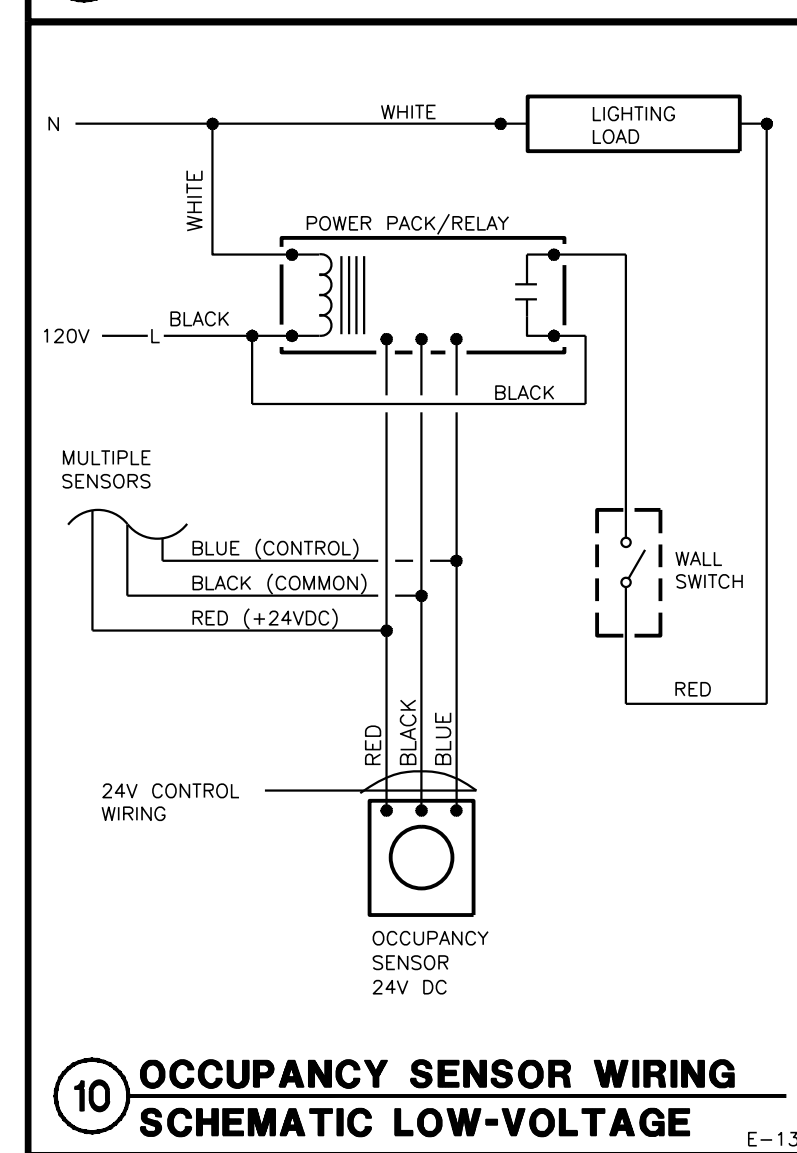
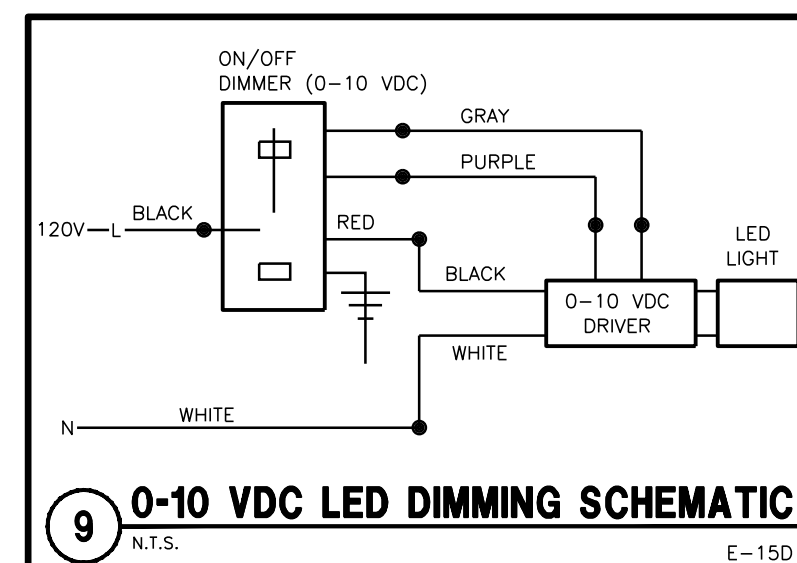
EQUIPMENT
B = BOILER
CU = CONDENSING UNIT
EWC = ELECT. WATER COOLER
F = FURNACE
ERV = ENERGY RECOVERY UNIT
EWH = ELECTRIC WATER HEATER
P = PUMP

NOTE:
REFER TO ARCHITECTURAL DRAWINGS FOR ADA MOUNTING HEIGHT REQUIREMENTS DIFFERENT THAN LISTED ON THIS SHEET & COMPLY WITH ARCHITECTURAL DRAWINGS FOR FINAL LOCATIONS & MOUNTING HEIGHTS.

NOTE:
ALL MOUNTING HEIGHTS ARE TO CENTER LINE OF DEVICE. REFER TO PLANS FOR OTHER REQ'D MTD. HEIGHTS.

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

5682 State Hwy 19
Westport, WI 53597



DATE OF ISSUE: 4259-2017

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PROJECT # 14099

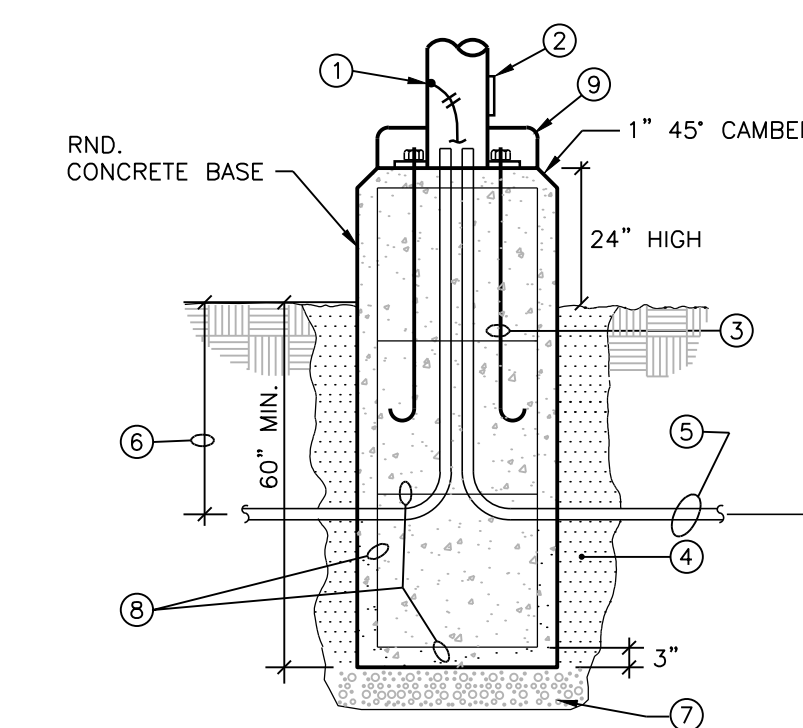
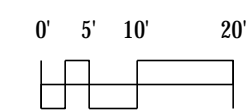
**ELECTRICAL
DETAILS**

**SCHUMACHER BARN
REMODEL/SITE
IMPROVEMENTS**

5682 State Hwy 19
Westport, WI 53597



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



1. GROUND POLE w/GROUND CONDUCTOR & LUG.
2. HAND HOLD WP COVER
3. ANCHOR BOLTS PER MFR'S REQUIREMENTS
4. COMPACTED GRANULAR FILL
5. 1" PVC BETWEEN FIXTURES
6. BURY CONDUIT OR RIGID CONDUIT - MIN 30" BELOW GRADE.
7. 6" COMPACTED GRAVEL BASE
8. 4 #3 VERTICAL w/ HORIZ. TIES EQUALLY SPACED
9. POLE BASE COVER

2 LIGHT POLE FOUNDATION DETAIL
N.T.S.

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**SITE
ELECTRICAL
PLAN**

SE1.0