DIVISION OF FINANCE – PURCHASING DEPARTMENT
100 N. Broadway St, Suite 610 Wichita, KS 67202 • Phone (316) 660-7255 • Fax (316) 660-1839
PURCHASING@SEDGWICK.GOV • SEDGWICKCOUNTY.ORG

ADDENDUM #1
RFB #25-0086
SEDGWICK COUNTY ELECTIONS AND RECORDS MANAGEMENT REMODEL

November 12, 2025

The following is to ensure that vendors have complete information prior to submitting a ***Request for Bid.*** Here are some clarifications regarding the Sedgwick County Elections and Records Management Remodel:

Questions and/or statements of clarification are in **bold** font, and answers to specific questions are *italicized.*

PLEASE SEE ATTACHED.

DATE FOR LAST QUESTIONS RECEIVED HAS BEEN CHANGED TO NOVEMBER 17, 2025.

Firms interested in submitting a ***Request for Bid*** must respond with complete information and **deliver on or before 1:45 pm *CST, December 2, 2025*.** Late responses will not be accepted and will not receive consideration for final award.

"PLEASE ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE RFB RESPONSE PAGE."

Lee Barrier

Lee Barrier, NIGP-CPP
Senior Purchasing Agent

LB/ch

Addendum Number One

This Addendum is hereby made part of the Contract Documents to the same extent as though it were originally included therein. Refer to "Bid Form" for acknowledgment of Addenda.

All Contractors, Subcontractors and suppliers are reminded that they shall be familiar with all Addenda items (as well as all parts of the Construction Documents) so as to understand the extent of their work and its interrelation with other trades.

To all bidders for furnishing all labor and materials necessary for the following Contract:

Sedgwick Co Elections and Records Management Remodel
3639 N. Comotara St
WICHITA, KANSAS 67226

Prepared by:
Schaefer Architecture

GENERAL:

ITEM AD1-G01 CLARIFICATION

Pre-Bid Questions:

Question: Spec No. 01 10 00 in the summary Page 3 is located after the table of contents will this be corrected?
Answer: 01 10 00 Summary reissued.

Question: Bid Terms and Request for Bid conditions document titles do not match; will this be corrected?
Answer: Spec 00 01 10 Table of Contents revised to reflect the change.

Question: Exhibit A is titled "Small Projects" but is about insurance. Should this be a separate document?
Answer: Exhibit A is correct.

Question: Subcontracting Work Sheet and Project Subcontracting have different titles, are they the same document?
Answer: Same document. Spec 00 01 10 Table of Contents revised to reflect the change.

Question: Spec 08 56 53 Security Windows - no information given. Will the County provide that information?
Answer: Spec 08 56 53 Security Windows removed from Spec 00 01 10 Table of Contents.

Question: Spec 11 19 00 Detention Equipment - no information given. Will the County provide that information?
Answer: Spec 11 19 00 Detention Equipment removed from Spec 00 01 10 Table of Contents.

Question: The Specs for Led Lighting Fixtures do not match. Will the County provide correct Spec?
Answer: Spec 25 50 10 LED Lighting Fixtures renamed in Spec 00 01 10

Table of Contents.

Question: Spec 27 00 00 Communications Systems Communications Systems (Conduit) have different titles, are they the same document?
Answer: Spec 27 00 00 Communications Systems (Conduit) renamed in Spec 00 01 10 Table of Contents.

Question: M10.0 Project Information Mechanical is missing from Index - will County provide? M10.1 Project Information Mechanical is missing - will County provide?
Answer: Page number corrected on G10.1 'Sheet Index'.

Question: E3.2 Floor Plan Area B- Lighting – document is missing will County provide?
Answer: G10.1 'Sheet Index' corrected. E3.2 will not be issued since there's no lighting work in Area B.

Question: Are rooms 102-116 getting CPT-1 only in alternate 1 or in base bid with a second carpet specified later for the alternate CPT-1? Please advise.
Answer: Base bid is for Rms 101, 101A, 119, and 120 to receive CPT-1. If Alternate 1 is accepted, Rooms 101A, 101-113, 115-120 will receive CPT-2 and CPT-1 will not be used at all. Reference updated sheets.

Question: For 124 Womens RR, is material to be owner provided from attic stock or are we to match existing?
Answer: No attic stock provided. Reference A72.1 for 'Finish Types'.

Question: There are notes indicating that the area in question must be 'sprinklered' for fire protection. There are no plans or specifications noting the same however. Please advise whether a fire suppression system is required and if so, the required line sizes, locations and routing, as well as any additional requirements.
Answer: Reference revised G14.1 Code Compliance.

ITEM AD1-G02 **Specification Section 00 01 07 Seals Page:**
REVISION Mechanical engineer's seal added.

ITEM AD1-G03 **Specification Section 00 01 10 Table of Contents:**
ADDITION Division 22 Plumbing and Division 23 Heating, Ventilation, and Air-Conditioning (HVAC) sections added.
REVISION 'Bid Terms' revised to 'Request for Bid Conditions'.
25 50 10 LED Lighting Fixtures renamed.
27 00 00 Communications Systems (Conduit) renamed.
DELETION The following sections removed from the table of Contents:
08 56 53 Security Windows
08 88 13 Fire-Rated Glazing
11 19 00 Detention Equipment

ITEM AD1-G04 **Instructions to Bidders**
REVISION The following dates have been revised in the 'Instructions to Bidders':
Last questions received – Monday, November 17, 2025 at 5:00 p.m. CDT

ITEM AD1-G05 **Bid Form**
REVISION Time of Completion and Phasing revised.

ITEM AD1-G06 **A104-2017**
REVISION Section 2.3.1 - Time of Completion and Phasing revised.

ITEM AD1-G07 **Specification Section 01 10 00 Summary:**
REVISION Section 1.07 Work Sequence revised to the following:

A. All areas of the project may commence upon Notice to Proceed (refer to drawings for phasing).
    1. Substantially complete Phase 1 area by April 20th, 2026.
    2. Finally complete Phase 1 area by April 27th, 2026.
    3. Substantially complete Phase 2 area by June 24, 2026.
    4. Finally complete Phase 2 area, including sitework by July 1st, 2026.

ITEM AD1-G08 **Specification Section 01 23 00 Alternates:**
REVISION Alternate No. One revised.
ADDITION Alternate No. Two added.

ITEM AD1-G09 **Specifications Division 22 Plumbing:**
ADDITION Division added.

ITEM AD1-G10 **Specifications Division 23 Heating, Ventilation, and Air-Conditioning (HVAC):**
ADDITION Division added.

ITEM AD1-G11 **Drawing Sheet G10.1:**
REVISION Sheet M10.0 sheet number corrected.
DELETION E3.2 sheet removed from sheet index.

ITEM AD1-G12 **Drawing Sheet G14.1:**
REVISION Project Information and Code Plan revised.
General Notes, Plumbing Fixtures, Symbol Legend, and U.L. Data revised.

ARCHITECTURAL:

ITEM AD1-A01 **Drawing Sheet A20.1:**
REVISION Keynotes Legend revised.
ADDIITON Door access control added to the storage warehouses.
Exit loop, exit button, access control pedestal added to electric sliding gate.

ITEM AD1-A02 **Drawing Sheet A21.1:**
REVISION Keynotes Legend revised.
Keynote tags revised.
Work in existing Rm 124 revised.
Door E124A renamed to S124A. Remove frame and closer from door.
Door S121 revised.
Door E121 hardware removed.
Door 149B renamed to E149B and to remain as is.
Door E109B to remain as is.

		Door E109 renamed to E109A.
	ADDIITON	Wall between Rm 107 and 108 to be demolished if Alternate 1 is accepted. Keynote tags added. Remove (2) existing fabric awning covers and vinyl decals.
	ITEM AD1-A03	**Drawing Sheet A22.1:**
	DELETION	Wall type 7D-2 removed. Wall does not need to extend to deck.
	REVISION	Keynotes Legend revised. Keynote tags revised. Phase Plan revised.
		Work in Rm 124 revised and Rm 124A added. Door E124A to S124A and to receive a new frame and hardware. Remove Door S121. Frame to remain. Door 149B renamed to E149B and to remain as is. Door E109B to remain as is.
		Door E109 renamed to E109A.
	ADDIITON	Keynote tags added. Wall between Rm 107 and Rm 108 added to Alternate 1. Fixed frame awning and fabric awning covers added. Staff Training room projector added.
		Push button door openers added to door E150B to the interior mullion and exterior pedestal.
	ITEM AD1-A04	**Drawing Sheet A22.1D:**
	REVISION	Dimension revised.
	ITEM AD1-A05	**Drawing Sheet A22.2:**
	REVISION	Keynotes Legend revised.
	ADDITION	Keynote tag added.
	ITEM AD1-A06	**Drawing Sheet A23.1:**
	REVISION	Keynotes Legend revised.
	ADDIITON	Keynote tags added. Dimensions for projector added. Mothers Rm 124A added.
	ITEM AD1-A07	**Drawing Sheet A28.1:**
	REVISION	Keynotes Legend revised. Room Finish Schedule revised. General Notes Legend revised for clarification.
		Clarified Alternate 1 scope.
	ADDIITON	Rm 124A added. Keynote tags added.
	ITEM AD1-A08	**Drawing Sheet A61.1:**
	REVISION	Detail D7 revised.
	ITEM AD1-A09	**Drawing Sheet A72.1:**
	REVISION	Existing Door & Frame Schedule revised. Door & Frame Schedule revised.
		Window & Frame Schedule revised. Glazing revised in W2.

	Reception Millwork revised.
	Partition Schedule revised. Wall type 7D-2 removed.
	Finish Types revised.
ADDIITON	Rm 124A added to Enlarged Restrooms plan.
	Mothers Rm 124A Elevation added.
	Awning Elevation added.
	Keynotes Legend added.

MECHANICAL:

ITEM AD1-M01	**Drawing Sheet M22.1**
REVISION	Return air grilles and/or diffusers in Rm 101A, 143, 146, 147, and 148 modified for lighting coordination.
	Diffuser in Rm 150 moved for wall change.
	Dehumidification system in Rm 131 modified for lighting coordination.
ITEM AD1-M02	**Drawing Sheet M31.1**
REVISION	Removed existing fixture for new mother's room. Existing pipes to be removed.
ITEM AD1-M03	**Drawing Sheet M22.1**
REVISION	Condensate piping in Rm 131 modified for lighting coordination.
	Added ice maker box to Rm 153.
ITEM AD1-M04	**Drawing Sheet M22.1**
ADDITION	Added ice maker box to plumbing fixture schedule.

ELECTRICAL:

ITEM AD1-E01	**Drawing Sheet E1.1:**
REVISION	General Notes: Note 12 modified.
ITEM AD1-E02	**Drawing Sheet E2.1:**
REVISION	Drive loop and access control note added.
	Accessible door opener push button added.
	Projection screen added.
	Relocate countertop receptacle to below in Rm 124A.
ADDITION	Receptacle and visual fire alarm added to Rm 124A.
ITEM AD1-E03	**Drawing Sheet E2.2:**
ADDITION	Wireless access points added.
ITEM AD1-E04	**Drawing Sheet E3.1:**
ADDITION	Wireless access points added.
	Ceiling mounted projector added.
	Rm 124A added to scope.
	New switch added to Rm 124.
ITEM AD1-E05	**Drawing Sheet E4.1:**
ADDITION	Wireless access points added.
	Accessible door opener push button added.

Attached
00 01 07 Seals Page
00 01 10 Table of Contents
03 – Bid Form
12 – A104-2017
01 10 00 Summary
01 23 00 Alternates
Division 22 – Plumbing
Division 23 – Heating, Ventilation, and Air-Conditioning (HVAC)

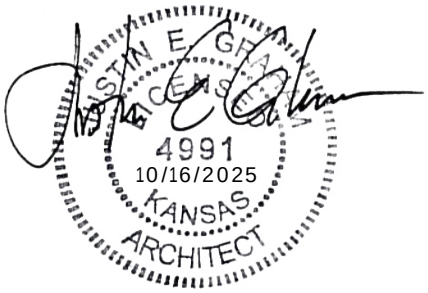
G10.1 – Cover & General Information
G14.1 – Code Compliance
A20.1 – Site Plan
A21.1 – Demolition Plan – Area A
A22.1 – Floor Plan – Area A
A22.1D – Dimension Plan – Area A
A22.2 – Floor Plan – Area B
A23.1 – Reflected Ceiling Plan – Area A
A28.1 – Finish Plan – Area A
A61.1 – General Details
A72.1 – Door & Frame Schedule
M22.1 – HVAC
M31.1 – Plumbing Demo Plan
M32.2 – Plumbing Plan
M70.2 – Mechanical Schedules
E1.1 – Electrical Schedules
E2.1 – Floor Plan Area A - Power
E2.2 – Floor Plan Area B - Power
E3.1 – Floor Plan Area A - Lighting
E4.1 – Floor Plan Area - Systems

End of Addendum Number One

SECTION 00 01 07 - SEALS PAGE

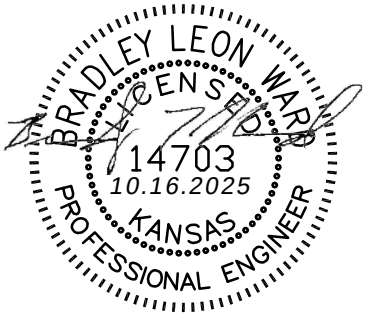
SCHAEFER ARCHITECTURE

ARCHITECTS



MIDWEST ENGINEERING, INC.

MECHANICAL ENGINEERS



INTEGRATED CONSULTING ENGINEERS

ELECTRICAL ENGINEERS

END OF SECTION

SECTION 00 01 10 - TABLE OF CONTENTS

DOCUMENT 004123 - BID FORM - CONSTRUCTION MANAGEMENT (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Sedgwick County Elections and Records Management Remodel.

C. Project Location: 3639 N Comotara, Wichita, Kansas 67226.

D. Owner: Sedgwick County.

E. Owner Project Number: 25-0086.

F. Architect: Schaefer Architecture.

G. Architect Project Number: 5278.57.

H. Construction Manager: N/A.

1.2 CERTIFICATIONS AND BASE BID

A. Base Bid, Single-Prime (All-Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Schaefer Architecture and the Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of above-named Project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. _____ Dollars ($_____).
2. The above amount may be modified by amounts indicated by the Bidder below in the Alternates.

1.3 ALTERNATES

A. The following are Alternates for specific portions of the Work as listed. The undersigned proposes to perform the Work called for in the following Alternates for the described additions to the above Base Bid. Refer to Section 01 23 00 for complete description of Alternate Work.

1. Alternate # 1 New Flooring (Add) (Deduct) $_____ Dollars.
   a. ALTERNATE #1 New flooring per drawings and specs.

2. Alternate # 2 (Add) (Deduct) $_____ Dollars.
   a. ALTERNATE #2 TIME OF COMPLETION

1) The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall ~~fully~~ substantially complete the Work as one phase by November 1, 2026. Liquidated damages of $750 per calendar day will be assessed if any milestones are not met.
   a) The Undersigned agrees to reach substantial completion of the entire Work as one phase in _____ consecutive calendar days from the date of Notice to Proceed.
   b) The Undersigned agrees to reach final completion of the entire Work as one phase in _____ consecutive calendar days from the date of Substantial Completion.
   c) Total Calendar Days _____

3. Alternate # 3 (Add) (Deduct) $_____ Dollars.

1.4 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars ($_____).

B. In the event Owner does not offer a Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall ~~fully~~ substantially complete the Work by June 24, 2026. Liquidated damages of $750 per calendar day will be assessed if any milestones are not met.
1. Phase 1 all work ~~fully~~ substantially complete by April 20, 2026.
2. Phase 1 all work finally complete by April 27, 2026
3. Phase 2 all work ~~fully~~ substantially complete by June 24, 2026.
4. Phase 2 all work finally complete by July 1, 2026

1.6 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.
2. Addendum No. 2, dated _____.

3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.
5. Addendum No. 5, dated _____.
6. Addendum No. 6, dated _____.
7. Addendum No. 7, dated _____.
8. Addendum No. 8, dated _____.

1.7 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in Wichita, Kansas, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.8 SUBMISSION OF BID

A. Respectfully submitted this ____ day of _____, 2025.

B. Submitted By:_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

F. Witnessed By:_____(Handwritten signature).

G. Attest:_____(Handwritten signature).

H. By:_____(Type or print name).

I. Title:_____(Corporate Secretary or Assistant Secretary).

J. Street Address:_____.

K. City, State, Zip:_____.

L. Phone:_____.

M. License No.:_____.

N. Federal ID No.:_____(Affix Corporate Seal Here).

END OF DOCUMENT 004123

DRAFT

AIA® Document A104™ – 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Sedgwick County Board of County Commissioners
525 N. Main
Wichita, Kansas 67203

and the Contractor:
(Name, legal status, address and other information)

«
« »

for the following Project:
(Name, location and detailed description)

«Sedgwick County Elections and Records Management Remodel
3639 N Comotara
Wichita, KS 67226

The Architect:
(Name, legal status, address and other information)

«Justin Graham
Schaefer Architecture
257 N Broadway, Wichita, KS, 67202
Telephone: (316) 684-0171
E-mail: jgraham@schaefer-arch.com

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

DRAFT

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TABLE OF ARTICLES

ARTICLE 1 THE WORK OF THIS CONTRACT

The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents listed in Article 6 of this Agreement or reasonably inferable by the Contractor from the Contract Documents as necessary to produce the results intended by the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« X »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check the appropriate box and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« X »] By the following date: « Reference phasing plan in drawings.
~~Phase 1 substantial work complete by March 31, 2026.~~
~~Phase 2 substantial work complete by May 31, 2026.~~
~~Phase 3 all work fully complete by July 31, 2026.~~
Phase 1 substantial work complete by April 20, 2026.
Phase 1 all work finally complete by April 27, 2026

Phase 2 substantial work complete by June 24, 2026.
Phase 2 all work finally complete by July 1, 2026
»

§ 2.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 2.3.3 All times stated in the Contract Documents, including, without limitation, those for the commencement, prosecution, interim milestones, and completion of the Work, and for the delivery and installation of materials and equipment, are of the essence in this Agreement.

§ 2.3.4 The date of substantial completion of the Work or a designated portion thereof is the date, certified by the Architect, when construction is sufficiently complete in accordance with the Contract Documents that the Owner may, if it so elects, occupy and use the Work or designated portion thereof for the purposes for which it was intended.

§ 2.3.5 If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the following daily amounts commencing upon the first day following expiration of the Contract Time and continuing until the Date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed completion of the Work: Seven Hundred Fifty Dollars and No Cents ($750.00).

§ 2.3.6 The Owner may deduct liquidated damages as described in the above paragraph from any unpaid amounts then or thereafter due the Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at a rate equal to the lower of the Treasury bill rate or the highest lawful rate of interest payable by the Contractor.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's proper performance of the Contract and the completion of the Work. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[« X »] Stipulated Sum, in accordance with Section 3.2 below

[« »] Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below

[« »] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be « » , subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 3.2.2 Unit prices, if any:
(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 3.2.3 Allowances, if any, included in the stipulated sum:
(Identify each allowance.)

Item	Price

§ 3.3 Cost of the Work Plus Contractor's Fee

§ 3.3.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4 Cost of the Work Plus Contractor's Fee With a Guaranteed Maximum Price

§ 3.4.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4.3 Guaranteed Maximum Price

§ 3.4.3.1 The sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed « » ($ « »), subject to additions and deductions by changes in the Work as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

(Insert specific provisions if the Contractor is to participate in any savings.)

« »

§ 3.4.3.2 The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 3.4.3.3 Unit Prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:

(Identify each allowance.)

Item	Price

§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:

« »

§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.

« »

ARTICLE 4 PAYMENT

§ 4.1 Progress Payments

§ 4.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month and the payment shall be less the specified retainage.

« »

§ 4.1.3 Provided that an Application for Payments is received by the Architect not later than the twenty-fifth (25th) day of a month, the Owner shall make payment to the Contractor not later than the third Friday of the next month. If an Application for Payment is received by the Architect after the date fixed above, payment shall be made by the Owner not later than thirty (30) days after the Architect received the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.3.1 Notwithstanding anything to the contrary in this Contract, payment of amounts due a Contractor from an Owner, except retainage, shall be made within 30 days after the Owner receives a timely, properly completed, undisputed request for payment according to terms of the contract, unless extenuating circumstances exist which would preclude approval of payment within 30 days. If such extenuating circumstances exist, than payment shall be made within 45 days after the Owner receives such payment request.

§ 4.1.3.2 If the Owner fails to pay Contractor within the time period set in Paragraph 4.1.3.1, the Owner shall pay interest computed at the rate of eighteen percent (18%) per annum on the undisputed amount to the Contractor beginning on the day following the end of the time period set forth in Paragraph 4.1.3.1.

§ 4.1.4 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold retainage from the payment otherwise due as follows:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

« Ten percent (10%) »

§ 4.1.5 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

§ 4.2 Final Payment
§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and

.3 a final Certificate for Payment has been issued by the Architect in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

ARTICLE 5 DISPUTE RESOLUTION
§ 5.1 Binding Dispute Resolution
For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Section 21.6 of this Agreement

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below. All documents listed herein that are not attached to this Agreement are incorporated by reference as if set forth fully herein. Such incorporation shall also include any additional documents, designs, or drawings that were directly referenced, and linked to, in the below-listed documents.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203–2013 incorporated into this Agreement.)

«N/A »

§ 6.1.3 The Supplementary and other Conditions of the Contract are those modified and contained in the Project Manual dated _____.

Document	Title	Date	Pages

§ 6.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« »

Section	Title	Date	Pages

§ 6.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:
(Check all boxes that apply.)

[« »] Exhibit A, Determination of the Cost of the Work.

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

« »

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of inconsistencies within or between parts of the Contracts Documents, or between the Contract Documents and applicable standards, codes, resolutions, and ordinances, the Contract shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement, either or both in accordance with the Architect's interpretation. The terms and conditions of this Paragraph 7.1, however, shall not relieve the Contractor of any obligations set forth in Paragraphs 9.1 and 9.6.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 7.4 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their

respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

§ 7.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 7.6 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 7.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 7.8 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 7.9.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 7.10 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and

covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or repeatedly fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

§ 8.4 Extent of Owner's Rights

§ 8.4.1 The rights stated in this Article 8 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) in law, or (iii) in equity.

§ 8.4.2 In no event shall Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for the safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Document.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Agreement, the Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work

is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climactic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Paragraph 16.2, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the contract Sum or Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Paragraph 9.1.1.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

§ 9.1.2.1 The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other contractors, is not guaranteed by the Architect or the owner.

§ 9.1.2.2 The Contractor shall, therefore, satisfy itself to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of its Work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 9.1.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

§ 9.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

§ 9.3 Labor and Materials

§ 9.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 9.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.3.4 The Contractor shall deliver, handle, store, and install materials in accordance with manufacturers' instructions.

§ 9.4 Warranty

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements shall be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage. All other warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3. The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such a manner so as to preserve any and all such manufacturer's warranties.

§ 9.5 Taxes

The Contractor shall pay sales, consumer, use, and other similar taxes that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 9.5.1 Materials

§ 9.5.1.1 Materials and equipment incorporated into this Project are exempt from the payment of sales tax under the laws of the State of Kansas.

§ 9.5.1.2 The owner will provide the contractor with a proper exemption certificate number when the notice to proceed is issued. Should the Owner fail to provide an exemption certification the Contractor shall notify the Architect in writing prior to placing any orders. The contractor shall be reimbursed for sales tax amounts for which he becomes liable until such exemption is provided.

§ 9.5.1.3 Upon issuance of a proper exemption certification number to the Contractor, the Contractor shall assume full responsibility for his own assessed penalties relating to the Contractor's improper use of the exemption certificate. Contractor shall comply with statutes of the State of Kansas related to sales tax exemption.

§ 9.5.1.4 The Contractor shall be responsible for furnishing the Owner a copy of all invoices bearing the exemption certification number pertaining to materials that are incorporated in this project.

§ 9.5.1.5 Contractor shall retain, for a period of not less than five years, all his and his subcontractor's invoices claiming sales tax exemption, properly identified with tax exemption number as required by State of Kansas.

§ 9.5.1.6 Upon completion of the Project, the Contractor shall execute and issue, to the Owner, a certificate of compliance on the form provided by the State Department of Revenue.

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

§ 9.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules, regulations and lawful orders of public authorities applicable to performance of the Work. The Contractor shall promptly notify the Architect and Owner if the Drawings and Specifications are observed by the Contractor to be at variance therewith. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, without such notice to the Architect and Owner, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 9.8.2 The Contractor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Architect.

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Architect reasonable time for review. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Architect will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. Each Party shall be entitled to rely upon the information provided by the other Party. The Architect will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Architect's review of Shop Drawings, Product Data, Samples, and similar submittals shall be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Architect will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 9.10.1 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

§ 9.10.2 The Contractor and any such entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner, which may be withheld in the sole discretion of the Owner.

§ 9.10.3 Without limitation of any other provision of the Contract Documents, Contractor shall use best efforts to minimize any interference with the occupancy or beneficial use of (i) any areas and building adjacent to the site of the Work, and (ii) the Building, in the event of partial occupancy. Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner.

§ 9.10.3.1 Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all resolutions, rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended for time to time. The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance with any portion of such resolutions, rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same result intended by such portions of the resolutions, rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives, or require compliance with the existing requirements of the resolutions, rules and regulations. In the even Owner requires compliance with subsequently adopted resolutions, rules and regulations, any resulting change in the Work shall be adjusted as provided in Article 13 of the Contract.

§ 9.10.4 The Contractor shall comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project site and the Building.

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 9.13 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 9.14 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 9.15 Indemnification

§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that 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), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 9.15.3 The Contractor's indemnity obligations under this Paragraph 9.15 shall also specifically include, without limitation, all fines, penalties, damages, liability, costs, and expenses (including, without limitation, reasonable attorney's fees) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, resolution, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible, (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work, and (iii) failure to secure and pay for permits, fees, approvals, licenses, and inspections, as required under the Contract Documents, or any violation of any permit of other approval of a public authority applicable to the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible.

§ 9.15.4 The Contractor shall indemnify and hold harmless all of the Indemnitees from and against any costs and expenses (including reasonable attorneys' fees) incurred by any of the Indemnitees in enforcing any of the Contractor's defense, indemnity, and hold harmless obligations under this Contract.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 10.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 10.3 The Architect will visit the site at intervals appropriate to the stage of the construction to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 10.4 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 10.5 Based on the Architect's evaluations of the Work and of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 10.6 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Architect will review and approve or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 10.8 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

§ 10.9 The Architect's decisions on matters relating to aesthetic effect, in connection with administration of the Contract, will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 12.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 12.2 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.

§ 12.4 The Contractor shall, as part of the Work, provide for the coordination of work to be performed by each separate contractor engaged by the Owner, if any, with the work to be performed by the Contractor or its Subcontractors of any tier. The Contractor shall use its best efforts to cooperate with the Owner and all separate contractors, their subcontractors, and any other entity involved in the performance of the Work. In order to cause the Work and any work to be performed by separate contractors to be completed in an expeditious manner, the Contractor agrees that it will ensure that such separate contractors have a reasonable opportunity to complete their work as and when required.

§ 12.5 If any part of the Work depends on the proper performance of the work of a separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Owner any apparent discrepancies or defects in such other work that render it unsuitable and prevent the Contractor from proceeding expeditiously with the Work.

§ 12.6 If the Contractor wrongfully causes damage to the Work or the property of the Owner, the Contractor shall promptly remedy such damage. If the Contractor wrongfully causes damage to the work or property of any separate contractor, the Contractor shall promptly attempt to settle any resulting dispute or claim with such other contractor.

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor, and Architect, or by written Construction Change Directive signed by the Owner and Architect. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Architect, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The Architect will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Architect will prepare a Change Order.

§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor; provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed. No adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or that reasonably should have been disclosed by the Contractor's (i) prior inspections, tests, reviews, and preconstruction services for the Project, or (ii) inspections, tests, reviews, and preconstruction services that the Contractor had the opportunity to make or should have performed in connection with the Project.

§ 13.5 Except as permitted in Paragraph 12.1, a change in the Contract Sum or the Contract Time shall be accomplished only by a Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 13.6 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

ARTICLE 14 TIME

§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 14.2 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 14.3 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.6.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control; or (3) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Architect. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

§ 15.2 Control Estimate

§ 15.2.1 Where the Contract Sum is the Cost of the Work, plus the Contractor's Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor's Fee.

§ 15.2.2 The Control Estimate shall include:

- **.1** the documents enumerated in Article 6, including all Modifications thereto;
- **.2** a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;
- **.3** a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor's Fee;
- **.4** a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information, schedule of shop drawings and samples, procurement and delivery of materials or equipment the Owner's occupancy requirements, and the date of Substantial Completion; and
- **.5** a list of any contingency amounts included in the Control Estimate for further development of design and construction.

§ 15.2.3 When the Control Estimate is acceptable to the Owner and Architect, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.

§ 15.2.4 The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Architect with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.

§ 15.2.5 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract

Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the Control Estimate and the revised Contract Documents.

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 15.1, for completed portions of the Work. The application shall be notarized, if required; be supported by all data substantiating the Contractor's right to payment that the Owner or Architect require; shall reflect retainage if provided for in the Contract Documents; and include any revised cost control information required by Section 15.2.4. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

§ 15.3.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

§ 15.3.5 Partial payments will be made monthly on proper application. Certification will be issued for ninety percent (90%) of the amount requested by the Contractor and approved by the Architect to be properly due until at least fifty percent (50%) of the Contract amount has been paid. Thereafter, the accumulated retainage will remain at five percent (5%) of the Contract amount (including additions, if any) except that should the Contractor at any time fail to keep current with the approved progress schedule, certification of ninety percent (90%) shall automatically again become effective and shall apply so long as the Contract progress lags behind such progress schedule.

§ 15.4 Certificates for Payment

§ 15.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner of the Architect's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluations of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 15.4.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

- **.1** defective Work not remedied;
- **.2** third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 15.4.4 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, that party may submit a Claim in accordance with Article 21.

§ 15.5 Progress Payments

§ 15.5.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in a similar manner.

§ 15.5.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

§ 15.5.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 15.5.4 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 15.6 Substantial Completion

§ 15.6.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 15.6.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 15.6.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. When the Architect determines that the Work or designated portion thereof is substantially complete, the Architect will issue a Certificate of Substantial Completion which shall

establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 15.6.4 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties, guarantees, operational and parts manuals required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Architect as part of the final Application for Payment. The final certificate of Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

§ 15.7.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from

- **.1** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 15.7.4 Acceptance of final payment by the Contractor, a Subcontractor or supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of the final Application for Payment.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is

responsible under Sections 16.1.2 and 16.1.3. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15. When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work, as necessary, from injury by any cause. The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner and the Architect.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 Contractor's Insurance

§ 17.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Section 17.1 or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 18.4, unless a different duration is stated below:

« »

§ 17.1.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « » ($ « ») each occurrence, « » ($ « ») general aggregate, and « » ($ « ») aggregate for products-completed operations hazard, providing coverage for claims including

- **.1** damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- **.2** personal and advertising injury;
- **.3** damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- **.4** bodily injury or property damage arising out of completed operations; and
- **.5** the Contractor's indemnity obligations under Section 9.15.

§ 17.1.3 Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than « » ($ « ») per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 17.1.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Section 17.1.2 and 17.1.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 17.1.5 Workers' Compensation at statutory limits.

§ 17.1.6 Employers' Liability with policy limits not less than « » ($ « ») each accident, « » ($ « ») each employee, and « » ($ « ») policy limit.

§ 17.1.7 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ 17.1.8 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ 17.1.9 Coverage under Sections 17.1.7 and 17.1.8 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ 17.1.10 The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Section 17.1 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 17.1.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy.

§ 17.1.11 The Contractor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor.

§ 17.1.12 To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required by this Section 17.1 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04.

§ 17.1.13 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.1, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 17.1.14 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ 17.2 Owner's Insurance

§ 17.2.2 Property Insurance

§ 17.2.2.1 The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, builder's risk insurance with a deductible not to exceed $1000.00 and sufficient to cover the total value of the entire Project on a replacement cost basis. The Contractor's builder's risk insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed or materials or equipment supplied by others.

The builder's risk insurance shall be maintained until Substantial Completion and thereafter as provided in Section 17.2.2.2, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 17.2.2.2 Unless the parties agree otherwise, upon Substantial Completion, the Contractor shall continue the insurance required by Section 17.2.2.1 or, if necessary, replace the insurance policy required under Section 17.2.2.1 with builder's risk insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 18.4.

§ 17.2.2.3 If the insurance required by this Section 17.2.2 is subject to deductibles or self-insured retentions, the Contractor shall be responsible for all loss not covered because of such deductibles or retentions.

§ 17.2.2.4 If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Contractor shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 18.4, builder's risk insurance with a deductible not to exceed $1000.00, on a replacement cost basis, protecting the existing structure against direct physical loss or damage, notwithstanding the undertaking of the Work. The Contractor shall be responsible for all co-insurance penalties.

§ 17.2.2.5 Prior to commencement of the Work, the Contractor shall secure the insurance, and provide evidence of the coverage, required under this Section 17.2.2 and, upon the Owner's request, provide a copy of the insurance policy or policies required by this Section 17.2.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ 17.2.2.6 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.2.2, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Owner: (1) the Owner, upon receipt of notice from the Contractor, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Contractor or the Owner and (2) the Contract Time and Contract Sum shall be equitably adjusted. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide required insurance.

§ 17.2.2.7 Waiver of Subrogation

§ 17.2.2.7.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 17.2.2.7 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 17.2.2.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements, written where legally required for validity, the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 17.2.3 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract.

§ 17.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense, unless compensable under Section A.1.7.3 in Exhibit A, Determination of the Cost of the Work. If prior to the date of Substantial Completion (for the purposes of this Agreement, a project is substantially complete when the Owner can legally take occupancy and use the facility for its intended purpose), the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

§ 18.2 In addition to the Contractor's obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.6.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor. The Owner shall, prior to making any written claim, provide the Contractor with an opportunity to make the corrections.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

§ 18.4 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 18.5 Upon completion of any Work under or pursuant to this Article 18, the one (1) year correction period in connection with the Work requiring correction shall be renewed and recommence. The obligations under Article 18 shall cover any repairs and replacement to any part of the Work or other property caused by the defective Work.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.

§ 19.3 Tests and Inspections
Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 19.4 The Owner's representative:
(Name, address, email address and other information)

« Andrew Dilts
Facilities Director
525 N Main, Suite 135, Wichita, KS 67202
Telephone: 316-660-9062
E-mail: Andrew.Dilts@sedgwick.gov

Tania Cole
Assistant County Manager
100 N Broadway, Suite 630, Wichita, KS, 67202
Telephone: (316) 660-9393
E-mail: Tania.Cole@sedgwick.gov

§ 19.5 The Contractor's representative:
(Name, address, email address and other information)

«

§ 19.6 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

ARTICLE 20 TERMINATION OF THE CONTRACT
§ 20.1 Termination by the Contractor
If the Architect fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 Termination by the Owner for Cause
§ 20.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor,

the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 20.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work executed; and costs incurred by reason of such termination, including costs attributable to termination of Subcontracts.

§ 20.3.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 20.3.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall;

§ 20.3.2.1 cease operations as directed by the Owner in the notice;

§ 20.3.2.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;

§ 20.3.2.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 20.3.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered, and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits. Owner shall be credited for (i) payments previously made to the Contractor for the terminated portion of the work, (ii) claims that the Owner has against the Contractor under the Contract, and (iii) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 16.2, shall be referred initially to the Architect for decision if the claimant recognizes the claim prior to the date of final payment. The Contractor and Owner shall not be obligated to resolve any claim, dispute or other matters related to the contract by mediation or arbitration. Any reference in the contract documents to mediation or arbitration is deemed void.

§ 21.2 Notice of Claims

§ 21.2.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the Architect within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 21.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.

§ 21.3 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this

Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.10 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

ARTICLE 22 Other Conditions or Provisions

§ 22.1 Contractor shall observe the provisions of the Kansas Acts Against Discrimination and shall not discriminate against any person in the performance of work under the present agreement because of race, religion, color, sex, disability, national origin or ancestry.

§ 22.2 In all solicitation or advertisements for employees, Contractor shall include the phrase "equal opportunity employer" or a similar phrase to be approved by the Kansas Human Rights Commission.

§ 22.3 If Contractor fails to comply with the manner in which Contractor reports to the Kansas Human Rights Commission in accordance with the provisions of K.S.A. 44-1031 and amendments thereto, Contractor shall be deemed to have breached the present contract and it may be canceled, terminated, or suspended in whole or in part, by Sedgwick County (Owner).

§ 22.4 If Contractor is found guilty of a violation of the Kansas Acts Against Discrimination under a decision of order of the Kansas Human Rights Commission which has become final, Contractor shall be deemed to have breached the present agreement and it may be canceled, terminated or suspended, in whole or in part, by Sedgwick County (Owner).

§ 22.5 Contractor shall include the provisions of the above paragraphs 22.1 through 22.4, inclusively, in every subcontract or purchase order so that such provisions will be binding upon such subcontractor or vendor.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« Purchasing Director »	« »« »
(Printed name and title)	*(Printed name and title)*

Approved as to Form:

_____
County Counselor

Attest:

_____

Kelly B. Arnold
County Clerk

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Sedgwick County Elections and Records Management Remodel
B. Owner's Name: Sedgwick County.
C. The Project consists of the alteration of office space and warehouse remodel.

1.02 PROJECT REQUIREMENTS

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
B. Scope of alterations work is indicated on drawings.
C. Renovate the following areas, complete including operational mechanical and electrical work and finishes:
   1. Office, warehouse, and site as indicated on drawings.
D. Plumbing: Alter existing and add new construction.
E. HVAC: Alter existing and add new construction.
F. Electrical Power and Lighting: Alter existing and add new construction.
G. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.
H. Telephone: Alter existing and add new construction.
I. Cameras and Access Control: Alter existing system and add new construction, keeping existing in operation.
J. Owner will remove the following items before start of work:
   1. Furniture and equipment.

1.04 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:
   1. Furnishings.
   2. Small equipment.
   3. General Contractor shall cooperate fully with separate contractors so work on those Contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other Contracts. Coordinate the Work of this Contract with Work performed under separate Contracts to the extent of scheduling and making the necessary spaces available.

1.05 OWNER OCCUPANCY

A. Owner intends to occupy adjacent portions of the existing building after completion of phase 1.
   1. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the day-to-day operations of the Owner. Maintain existing exits unless otherwise indicated.
   2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or

used facilities without written permission from Owner and approval of authorities having jurisdiction.
3. Notify the Owner not less than 72 hours in advance of activities that will affect the operations of the Owner.

B. Owner intends to occupy the Project by the date stated in the Agreement as the contract completion date.
C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
B. Arrange use of site and premises to allow:
1. Owner occupancy.
2. Work by Others.
C. Provide access to and from site as required by law and by Owner:
1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Provide temporary exiting pathways as indicated.
3. Do not obstruct roadways, sidewalks, or other public ways without permit.
D. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied and as coordinated with the Owner.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.
4. Do not disrupt or shut down power to LAN/WAN systems without coordination with the Owner. It is the responsibility of the General Contractor to identify these locations with assistance from the Owner prior to starting any Work.
E. Controlled Substances: Use of tobacco products and other controlled substances within the new or existing building or the Project site is not permitted.

1.07 WORK SEQUENCE

A. All areas of the project may commence upon Notice to Proceed (refer to drawings for phasing).
1. Substantially complete Phase 1 area by April 20th, 2026.
2. Finally complete Phase 1 area by April 27th, 2026.
3. Substantially complete Phase 2 area by June 24, 2026.
4. Finally complete Phase 2 area, including sitework by July 1st, 2026.
B. Coordinate construction schedule and operations with Owner.

1.08 PERMANENT UTILITIES

A. Owner will pay the direct cost from the utility company for the permanent service for the following:
1. Electric.
2. Gas.
3. Water.

4. Telephone.
5. Cable.

B. All other fees and Work shall be included in the cost of Bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00 - ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.
B. Procedures for pricing Alternates.

1.02 ALTERNATES - GENERAL

A. Alternates are units of Work (products, materials, equipment, systems, methods and the like) which may, at the option of the Owner and under terms established in the Instructions to Bidders and Agreement, be selected for the Work in lieu of the corresponding requirements for Base Bid or to complete a unit of work not included in the Base Bid Work.
B. Selection may be made prior to Contract Date, or may by the Agreement, be deferred for possible selection at a subsequent date.
C. Refer to the Contract or Owner-Contractor Agreement, and subsequent modifications thereof (if any), for the determination of which Alternates have been accepted and therefore are in effect as though included originally in the Base Bid Work.
D. Immediately following the award of Contract notify each entity or person involved in the performance of this project work, a notice of the status of each Alternate Bid indicating which Alternates have been: 1) accepted, 2) rejected, 3) deferred for consideration at a later date. Include description of modifications, if any, to the accepted Alternates.
E. The Alternates herein are abbreviated descriptions but imply that each change must be complete for the scope of the work affected. A reference to this Section is included in specification sections to alert specification users that an alternate will affect that work. The Specifications and Drawings shall be referred to ascertain complete requirements for the Alternate Work. Coordinate related work and modify surrounding work as required to properly integrate or omit the work of the accepted Alternates.

1.03 ACCEPTANCE OF Alternates

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
B. Fill in all required prices on the Bid Form.
C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF Alternates

A. **Alternate No. One - Remove all base and flooring in areas indicated in the drawings. Provide new base and flooring as indicated on Finish Schedule. Remove the wall between Rm 107 and Rm 108 up to header indicated.**
B. **Alternate No. Two - 1) The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work by November 1, 2026. Liquidated damages of $750 per calendar day will be assessed if any milestones are not met.**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

22 05 05 PLUMBING GENERAL PROVISIONS

PART 1 GENERAL

GENERAL INFORMATION:

The General Requirements and Supplementary Conditions are part of this contract and govern work under this division.

SCOPE OF WORK:

Work by Mechanical Contractor: Provide all mechanical systems indicated by the drawings, specified or as instructed otherwise. Unless specified otherwise, provide all labor, materials and equipment necessary to provide a complete and operational system.

Work by Electrical Contractor: Provide all line voltage wiring and install items of equipment furnished by the Mechanical, such as thermostats, remote control panels, etc.

Mechanical and Electrical Coordination: The Mechanical will provide to the Electrical all manufacturer's wiring diagrams and installation data and locate all equipment furnished to the Electrical.

Where work or materials are specified or shown on drawings to be performed by more than one Contractor, each such Contractor will be deemed to have figured the item and the Architect will determine who shall furnish the work and who shall submit the credit to the Owner.

Work by General Contractor: Provide all openings and chases with proper framing and reinforcing as required for Mechanical equipment.

Provide access panels or doors where required for mechanical systems.

Provide concrete pads for all base mounted mechanical equipment.

DEFINITIONS:

Contractor: The contractor performing work under this Division of the Specifications.

Provide: Contractor is responsible to furnish and install component completely.

QUALITY ASSURANCE:

Manufacturers: Acceptable manufacturers are listed in applicable sections of the Specifications and on the drawings.

Drawings and Specifications are complimentary. Requirements indicated in either are binding and the most stringent is to be used.

The Contractor is to review documents for the work, and if any discrepancies occur between the work of this Division and the work of another Division, is to notify the Architect and obtain written instructions for any changes necessary. Any changes in the work by this Division made necessary by the failure or neglect of the Contractor to report such discrepancies will be made by, and at the expense of the Contractor.

Changes in Design or Installation: Refer to the General and Supplementary Conditions for requirements pertaining to changes in design and installation. Mechanical installation will otherwise be in accordance with the Contract Drawings and Specifications.

REGULATORY AGENCIES:

Permits and Fees: The Contractor is to pay for all permits and fees as required by Local or State regulatory agencies.

Codes: Work for this project is to comply with Federal, State and Local codes, ordinances and regulations. All work shall comply the latest adopted edition of the Building Code and associated sections of the National Fire Protection Association.

Work shall be done according to applicable codes in cases of conflict between specifications, plans and codes, except where plans and specifications call for higher standards than the codes.

SUBMITTALS AND SHOP DRAWINGS:

Submit product data and copies of shop drawings for all major pieces of equipment as indicated in the respective sections of this Division.

The intent of shop drawing submittals by the Contractor is to demonstrate to the Architect / Engineer that the Contractor understands the design concept and demonstrates his understanding by indicating and detailing the fabrication and installation methods to be used.

If deviations, discrepancies or conflicts between shop drawing submittals and Contract Documents are discovered either prior to or after shop drawing submittals are processed, the design drawings and specifications shall take precedence.

The Architect / Engineer shall review shop drawings for general conformance with the design concept of the project. The review shall not relieve the Contractor of the responsibility of compliance with the contract documents or errors in the shop drawings.

PRODUCT DELIVERY, STORAGE AND HANDLING:

Make provisions for the delivery and safe storage of all material and make the required arrangements with other trades to coordinate moving large pieces of equipment into the building.

Where materials are indicated to be "Furnished by Others" to the Contractor for installation, these materials shall be checked and their delivery properly receipted. After delivery the Contractor assumes all responsibility for the safekeeping of such equipment.

All materials stored outside are to be covered and protected with weatherproof material.

JOB CONDITIONS:

Verify existing site conditions and location prior to bidding.

Verify existing utilities and the actual location of in reference to location of such as shown on drawings. Any deviations between actual conditions and plan locations will be reviewed with the Architect. Repair, patch or terminate utilities encountered in an acceptable manner regardless of whether shown or not.

GUARANTEE:

The Contractor is to guarantee all materials, equipment, workmanship and operation of all systems for a period of one (1) year from the date of final acceptance of the entire project. Guarantee to repair or replace at Contractor's expense any art of the work which may be defective during that time provided that such defect is, in the opinion of the Architect / Engineer, due to imperfect material or workmanship and not to carelessness or improper use.

PART 2 PRODUCTS

STANDARDS FOR EQUIPMENT AND MATERIALS:

All material shall be labeled UL, ETL, AGA or other approved independent testing authority.

All pressure rated vessels shall be provided with an ASME stamp, meeting the ASME Code or the Local Authority, whichever is most stringent.

All materials and equipment shall be of the best quality and be new, unused and without damage.

System design is based upon the first manufacturer listed in the Specifications and the other named manufacturers are considered equivalent. Any costs attributed in changes in ductwork, piping, plumbing, space clearances or other trades is to be borne by the Contractor when another manufacturer is used in lieu of the first listed.

MATERIALS OF APPROVED EQUAL:

Unless request for changes in base bid specifications are received and approved ten (10) days prior to the opening of bids, the successful Contractor will be held to furnish specified items under base bid.

PART 3 EXECUTION

PREPARATION:

Base final installation of all materials and equipment on field dimensions and conditions at the building. The Mechanical Contractor is to inspect all work that affects the work of this Division and report any deficiencies to the General Contractor and Architect. No extra compensation will be allowed on account of minor differences in actual dimensions and those indicated on the plans.

INSTALLATION:

Workmanship: Perform all work in accordance with good commercial practice.

Supervision: The superintendent shall be responsible for the work of this Division and of all subcontractors under this Division. All questions or directions will be directed through the superintendent.

Installation Procedures:

A. Field verify exact location, size, routing, elevation and accessibility of existing and new HVAC and plumbing systems.

B. Properly size and locate all anchors, chases, recesses and openings required for the proper installation of the work.
C. Piping and equipment located in areas subject to low temperatures shall be installed in a manner to prevent freezing.
D. All equipment and materials are to be installed as high as possible.
E. Install equipment and systems in accordance with manufacturer's recommends, accepted industry standards and all applicable Codes.

END OF SECTION

22 05 06 BASIC PLUMBING MATERIALS AND METHODS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes the following basic mechanical materials and methods to complement other Division 22 Sections.

A. Piping materials and installation instructions common to most piping systems.
B. Concrete base construction requirements.
C. Escutcheons.
D. Dielectric fittings.
E. Flexible connectors.
F. Mechanical sleeve seals.
G. Equipment nameplate data requirements.
H. Labeling and identifying mechanical systems and equipment is specified in Division 15 Section "Mechanical Identification."
I. Nonshrink grout for equipment installations.
J. Field-fabricated metal and wood equipment supports.
K. Installation requirements common to equipment specification sections.
L. Mechanical demolition.
M. Cutting and patching.
N. Touchup painting and finishing.

Plumbing pipe and pipe fitting materials are specified in Division 22 piping system Sections.

DEFINITIONS:

Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

The following are industry abbreviations for plastic materials:

A. ABS: Acrylonitrile-butadiene-styrene plastic.
B. CPVC: Chlorinated polyvinyl chloride plastic.
C. NP: Nylon plastic.
D. PE: Polyethylene plastic.
E. PVC: Polyvinyl chloride plastic.

The following are industry abbreviations for rubber materials:

A. CR: Chlorosulfonated polyethylene synthetic rubber.
B. EPDM: Ethylene propylene diene terpolymer rubber.

SUBMITTALS:

Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

QUALITY ASSURANCE:

Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

DELIVERY, STORAGE, AND HANDLING:

Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

Protect flanges, fittings, and piping specialties from moisture and dirt.

Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

SEQUENCING AND SCHEDULING:

Coordinate mechanical equipment installation with other building components.

Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."

Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Dielectric Unions:
   1. Capitol Manufacturing Co.
   2. Central Plastics Co.
   3. Eclipse, Inc.; Rockford-Eclipse Div.
   4. Epco Sales Inc.
   5. Hart Industries International, Inc.
   6. Watts Industries, Inc.; Water Products Div.
   7. Zurn Industries, Inc.; Wilkins Div.

B. Dielectric Flanges:
   1. Capitol Manufacturing Co.
   2. Central Plastics Co.
   3. Epco Sales Inc.
   4. Watts Industries, Inc.; Water Products Div.

C. Dielectric-Flange Insulating Kits:
   1. Calpico, Inc.
   2. Central Plastics Co.

D. Dielectric Couplings:
   1. Calpico, Inc.
   2. Lochinvar Corp.

E. Dielectric Nipples:
   1. Grinnell Corp.; Grinnell Supply Sales Co.
   2. Perfection Corp.

3. Victaulic Co. of America.

F. Metal, Flexible Connectors:
   1. ANAMET Industrial, Inc.
   2. Central Sprink, Inc.
   3. Flexicraft Industries.
   4. Flex-Weld, Inc.
   5. Grinnell Corp.; Grinnell Supply Sales Co.
   6. Hyspan Precision Products, Inc.
   7. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
   8. Mercer Rubber Co.
   9. Metraflex Co.
   10. Proco Products, Inc.
   11. Uniflex, Inc.
   12. Flexonics.

PIPE AND PIPE FITTINGS:

Refer to individual Division 22 piping Sections for pipe and fitting materials and joining methods.

Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

JOINING MATERIALS:

Refer to individual Division 22 piping Sections for special joining materials not listed below.

Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

A. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, unless thickness or specific material is indicated.
   1. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   2. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

Solder Filler Metals: ASTM B 32.

A. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
B. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

Brazing Filler Metals: AWS A5.8.

A. BCuP Series: Copper-phosphorus alloys.

B. BAg1: Silver alloy.

Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

Solvent Cements: Manufacturer's standard solvent cements for the following:

A. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

A. Sleeve: ASTM A 126, Class B, gray iron.
B. Followers: ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 536 ductile iron.
C. Gaskets: Rubber.
D. Bolts and Nuts: AWWA C111.
E. Finish: Enamel paint.

DIELECTRIC FITTINGS:

General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

Insulating Material: Suitable for system fluid, pressure, and temperature.

Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

A. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

PIPING SPECIALTIES:

Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

A. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
B. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
   1. Underdeck Clamp: Clamping ring with set screws.

Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

A. ID: Closely fit around pipe, tube, and insulation of insulated piping.
B. OD: Completely cover opening.
C. Cast Brass: One piece, with set screw.
   1. Finish: Rough brass.
   2. Finish: Polished chrome-plate.

D. Cast Brass: Split casting, with concealed hinge and set screw.
   1. Finish: Rough brass.
   2. Finish: Polished chrome-plate.

E. Stamped Steel: One piece, with set screw and chrome-plated finish.
F. Stamped Steel: One piece, with spring clips and chrome-plated finish.
G. Stamped Steel: Split plate, with concealed hinge, set screw, and chrome-plated finish.
H. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
I. Stamped Steel: Split plate, with exposed-rivet hinge, set screw, and chrome-plated finish.
J. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
K. Cast-Iron Floor Plate: One-piece casting.

GROUT:

Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

A. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
B. Design Mix: 5000-psig (34.5-MPa), 28-day compressive strength.
C. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

PIPING SYSTEMS - COMMON REQUIREMENTS:

General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 22 piping Sections specify unique piping installation requirements.

General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general

location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

Install piping at indicated slope.

Install components with pressure rating equal to or greater than system operating pressure.

Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

Install piping free of sags and bends.

Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.

Locate groups of pipes parallel to each other, spaced to permit valve servicing.

Install fittings for changes in direction and branch connections.

Install couplings according to manufacturer's written instructions.

Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

A. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
B. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
C. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
D. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
E. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

Sleeves are not required for core drilled holes.

Permanent sleeves are not required for holes formed by PE removable sleeves.

Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

A. Cut sleeves to length for mounting flush with both surfaces.
    1. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

B. Build sleeves into new walls and slabs as work progresses.
C. Install sleeves large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
   1. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
   2. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger, penetrating gypsum-board partitions.
   3. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
      a. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

D. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Section "Joint Sealants" for materials.
E. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

Verify final equipment locations for roughing-in.

Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   2. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
   3. Align threads at point of assembly.
   4. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
   5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding

operators according to "Quality Assurance" Article.

G. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
H. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. PVC Nonpressure Piping: ASTM D 2855.

Piping Connections: Make connections according to the following, unless otherwise indicated:

A. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
B. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
C. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
D. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

EQUIPMENT INSTALLATION - COMMON REQUIREMENTS:

Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

Install equipment giving right of way to piping installed at required slope.

Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

PAINTING AND FINISHING:

Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

Apply paint to exposed piping according to the following, unless otherwise indicated:

A. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.

B. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
C. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
D. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
E. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
F. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

Do not paint piping specialties with factory-applied finish.

Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

CONCRETE BASES:

Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

ERECTION OF METAL SUPPORTS AND ANCHORAGE:

Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

ERECTION OF WOOD SUPPORTS AND ANCHORAGE:

Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

Attach to substrates as required to support applied loads.

DEMOLITION:

Disconnect, demolish, and remove Work specified in Division 22 Sections.

If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.

Removal: Remove indicated equipment from Project site.

Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

CUTTING AND PATCHING:

Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

Repair cut surfaces to match adjacent surfaces.

GROUTING:

Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

Clean surfaces that will come into contact with grout.

Provide forms as required for placement of grout.

Avoid air entrapment during placing of grout.

Place grout, completely filling equipment bases.

Place grout on concrete bases to provide smooth bearing surface for equipment.

Place grout around anchors.

Cure placed grout according to manufacturer's written instructions.

END OF SECTION

22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes hangers and supports for mechanical system piping and equipment.

Related Sections include the following:

A. Division 5 Section "Metal Fabrications" for materials for attaching hangers and supports to building structure.

DEFINITIONS:

MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

PERFORMANCE REQUIREMENTS:

Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

SUBMITTALS:

Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.

Welding Certificates: Copies of certificates for welding procedures and operators.

QUALITY ASSURANCE:

Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support and trapeze by a qualified professional engineer.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Pipe Hangers:
   1. AAA Technology and Specialties Co., Inc.
   2. B-Line Systems, Inc.
   3. Erico.
   4. Globe Pipe Hanger Products, Inc.
   5. Grinnell Corp.
   6. GS Metals Corp.
   7. National Pipe Hanger Corp.
   8. PHD Manufacturing, Inc.
   9. PHS Industries, Inc.
   10. Piping Technology & Products, Inc.

B. Channel Support Systems:
   1. B-Line Systems, Inc.
   2. Erico.
   3. Grinnell Corp.; Power-Strut Unit.
   4. GS Metals Corp.
   5. National Pipe Hanger Corp.
   6. Thomas & Betts Corp.
   7. Unistrut Corp.

C. Thermal-Hanger Shield Inserts:
   1. PHS Industries, Inc.
   2. Pipe Shields, Inc.
   3. Rilco Manufacturing Co., Inc.
   4. Value Engineered Products, Inc.

D. Powder-Actuated Fastener Systems:
   1. Gunnebo Fastening Corp.
   2. Hilti, Inc.
   3. ITW Ramset/Red Head.
   4. Masterset Fastening Systems, Inc.

MANUFACTURED UNITS:

Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

A. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

A. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation,

encased in sheet metal shield.

A. Material for Piping: ASTM C 552, Type I cellular glass or high density polyisocyanurate insulation.
B. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
C. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
D. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield.

MISCELLANEOUS MATERIALS:

Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.

A. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
B. Properties: Nonstaining, noncorrosive, and nongaseous.
C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

HANGER AND SUPPORT APPLICATIONS:

Specific hanger requirements are specified in Sections specifying equipment and systems.

Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

All hangers are to be sized to allow for continuous installation of insulation and thermal insulation shield. Hangers are to sized to match the O.D. of insulated pipes or O.D. of uninsulated pipes.

Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).
B. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8 (DN20 to DN200).
C. Roof Pillow Block Pipestands: Adjustable height roller bearing pipe support. Self-lubricated polycarbonate roller polycarbonate resin rod. Pipe support base of polycarbonate or stainless steel.

Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
B. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.

Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
B. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
C. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
D. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
E. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
B. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
C. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
D. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
E. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
F. C-Clamps (MSS Type 23): For structural shapes.
G. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
H. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
I. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
J. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
K. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
L. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    1. Light (MSS Type 31): 750 lb (340 kg).
    2. Medium (MSS Type 32): 1500 lb (675 kg).
    3. Heavy (MSS Type 33): 3000 lb (1350 kg).

M. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
N. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
O. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where head room is limited.

Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
B. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
C. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, high density polyisocyanurate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

HANGER AND SUPPORT INSTALLATION:

Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

A. Field assemble and install according to manufacturer's written instructions.

Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

Insulated Piping: Comply with the following:

A. Attach clamps and spacers to piping.
   1. Use thermal-hanger shield insert with clamp sized to match OD of insert.
   2. Do not exceed pipe stress limits according to ASME B31.9.

B. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.

C. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
   1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.

D. Shield Dimensions for Pipe: Not less than the following:
   1. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
   2. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
   3. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
   4. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
   5. NPS 16 to NPS 24 (DN400 to DN600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.

E. Insert Material: Length at least as long as protective shield.
F. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

EQUIPMENT SUPPORTS:

Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

Grouting: Place grout under supports for equipment and make smooth bearing surface.

METAL FABRICATION:

Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

A. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
B. Obtain fusion without undercut or overlap.
C. Remove welding flux immediately.
D. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

ADJUSTING:

Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

PAINTING:

Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

A. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."

Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes mechanical identification materials and devices.

SUBMITTALS:

Product Data: For identification materials and devices.

Valve Schedules: For each piping system. Reproduce on standard-size bond paper. Tabulate valve number, piping system, system abbreviation as shown on tag, room or space location of valve, and variations for identification. Mark valves intended for emergency shutoff and similar special uses. Besides mounted copies, furnish copies for maintenance manuals specified in Division 1.

QUALITY ASSURANCE:

Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

SEQUENCING AND SCHEDULING:

Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

IDENTIFYING DEVICES AND LABELS:

General: Products specified are for applications referenced in other Division 22 Sections. If more than single type is specified for listed applications, selection is Installer's option.

Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

A. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
B. Location: Accessible and visible.

Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.

Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-

sensitive, vinyl type with permanent adhesive.

Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.

Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.

Lettering: Manufacturer's standard preprinted captions as selected by Architect.

Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

A. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils (0.08 mm) thick.

A. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
B. Color: Comply with ASME A13.1, unless otherwise indicated.

Valve Tags: Stamped or engraved with 1/4-inch (6-mm) letters for piping system abbreviation and 1/2-inch (13-mm) sequenced numbers. Include 5/32-inch (4-mm) hole for fastener.

A. Material: 0.032-inch- (0.8-mm-) thick, polished brass.
B. Size: 1-1/2-inches (40-mm) diameter, unless otherwise indicated.
C. Shape: As indicated for each piping system.

Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

Access Panel Markers: 1/16-inch- (2-mm-) thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8-inch (3-mm) center hole for attachment.

Valve Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include screws.

A. Frame: Extruded aluminum.
B. Glazing: ASTM C 1036, Type I, Class 1, Glazing quality B, 2.5-mm, single-thickness glass.

Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

A. Green: Cooling equipment and components.
B. Yellow: Heating equipment and components.
C. Brown: Energy reclamation equipment and components.
D. Blue: Equipment and components that do not meet criteria above.
E. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
F. Terminology: Match schedules as closely as possible. Include the following:
    1. Name and plan number.
    2. Equipment service.
    3. Design capacity.

4. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

G. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

A. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 EXECUTION

LABELING AND IDENTIFYING PIPING SYSTEMS:

Install pipe markers on each system. Include arrows showing normal direction of flow.

Marker Type: Plastic markers, with application systems. Install on pipe insulation segment where required for hot, noninsulated pipes.

Fasten markers on pipes and insulated pipes smaller than 6 inches (150 mm) OD by one of following methods:

A. Snap-on application of pretensioned, semirigid plastic pipe marker.
B. Adhesive lap joint in pipe marker overlap.
C. Laminated or bonded application of pipe marker to pipe or insulation.
D. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 3/4 inch (20 mm) wide, lapped a minimum of 1-1/2 inches (40 mm) at both ends of pipe marker, and covering full circumference of pipe.

Fasten markers on pipes and insulated pipes 6 inches (150 mm) in diameter and larger by one of following methods:

A. Laminated or bonded application of pipe marker to pipe or insulation.
B. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches (40 mm) wide, lapped a minimum of 3 inches (75 mm) at both ends of pipe marker, and covering full circumference of pipe.
C. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.

Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:

A. Near each valve and control device.
B. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
C. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.
D. At access doors, manholes, and similar access points that permit view of concealed piping.
E. Near major equipment items and other points of origination and termination.

F. Spaced at a maximum of 50-foot (15-m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in areas of congested piping and equipment.
G. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

VALVE TAGS:

Install on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.

Valve Tag Application Schedule: Tag valves according to size, shape, color scheme, and with captions similar to those indicated in the following:

Tag Material: Brass.

Tag Color: Natural.

Letter Color: Black.

Install mounted valve schedule in each major equipment room.

EQUIPMENT SIGNS AND MARKERS:

Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment.

ADJUSTING AND CLEANING:

Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.

Clean faces of identification devices and glass frames of valve charts.

END OF SECTION

22 11 16 DOMESTIC WATER PIPING

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes water distribution piping from locations indicated to fixtures and equipment inside building.

Related Sections include the following:

A. Division 22 Section "Meters and Gages" for thermometers, pressure gages, and fittings.
B. Division 22 Section "Plumbing Specialties" for water distribution piping specialties.

DEFINITIONS:

Water Service Piping: Water piping outside building that conveys water to building.

Service Entrance Piping: Water piping at entry into building between water service piping and water distribution piping.

Water Distribution Piping: Water piping inside building that conveys water to fixtures and equipment throughout the building.

The following are industry abbreviations for plastic piping materials:

A. CPVC: Chlorinated polyvinyl chloride.
B. NP: Nylon.
C. PB: Polybutylene.
D. PE: Polyethylene.
E. PP: Polypropylene.
F. PVC: Polyvinyl chloride.

SYSTEM PERFORMANCE REQUIREMENTS:

Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

A. Service Entrance Piping: 160 psig (1100 kPa).
B. Water Distribution Piping: 125 psig (860 kPa).

SUBMITTALS:

Water Samples, Test Results, and Reports: Specified in "Field Quality Control" and "Cleaning" articles.

Grooved Joint Couplings and Fittings: Shall be shown on drawings and product submittals, and shall

be specifically identified with the applicable style or series designation.

QUALITY ASSURANCE:

Provide listing/approval stamp, label, or other marking on piping made to specified standards.

Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water piping components. Include marking "NSF-pw" on plastic potable-water piping.

Comply with NSF 61, "Drinking Water System Components--Health Effects," Sections 1 through 9 for potable-water piping and components.

All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

A. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

PART 2 PRODUCTS

PIPES AND TUBES:

General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.

Soft Copper Tube: ASTM B 88, Types K (ASTM B 88M, Type A), water tube, annealed temper.

Hard Copper Tube: ASTM B 88, Types L (ASTM B 88M, Type B), water tube, drawn temper.

PIPE AND TUBE FITTINGS:

General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.

Copper, Solder-Joint Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper.

Copper, Grooved-End Fittings: ASME B16.22 wrought copper and ASTM B 75 (ASTM B 75M) copper tube or ASME B16.18 cast-copper alloy and ASTM B 584 bronze castings. Copper-tubing sized grooved ends (flaring ends to accommodate alternate sized couplings is not permitted).

Copper, Press-to-Connect Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper, with 301 stainless steel internal components and EPDM seals.

Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

Copper Unions: ASME B16.18, cast-copper-alloy, hexagonal-stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends. Include threads conforming to ASME B1.20.1 on threaded ends.

JOINING MATERIALS:

General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

Refer to Division 22 Section "Basic Mechanical Materials and Methods" for commonly used joining materials.

Solder: ASTM B 32, Alloy Sn95, Sn94, or E; lead free.

Brazing Filler Metal: AWS A5.8, BCuP, copper phosphorus or BAg, silver classification.

A. Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.
B. Transition Couplings for Grooved Pipe: For direct transition from AWWA Ductile iron pipe to IPS / steel pipe sizes, couplings shall include housings cast with offsetting angle-pattern bolt pads to provide rigidity and FlushSeal® gasket. Victaulic Style 307.

Grooved Joint Lubricants: Lubricate gaskets in accordance with the manufacturer's recommendations with lubricant supplied by the coupling manufacturer that is suitable for the gasket elastomer and system media. Victaulic 'Vic-Lube'.

A. Gaskets shall be UL classified in accordance with ANSI/NSF-61 for Potable water service.

VALVES:

Refer to Division 22 Section "Valves" for general-duty valves.

Refer to Division 22 Section "Plumbing Specialties" for special-duty valves.

PART 3 EXECUTION

PIPING APPLICATIONS:

Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

Flanges may be used on aboveground piping, unless otherwise indicated.

Aboveground, Water Distribution Piping: Use the following:

A. 1-1/2" NPS (DN40) and Smaller: Hard copper tube, Type L (Type B); copper, solder-joint fittings; and soldered joints.
B. 1-1/2" NPS (DN40) and Smaller: Hard copper tube, Type L (Type B); copper, press-to-connect fittings and joints.
C. 2" through 3-1/2" NPS (DN50 to DN90): Hard copper tube, Type L (Type B); copper, solder-joint fittings, and soldered joints or with grooved ends, copper, grooved-end fittings and copper keyed couplings.

Underground, Water Distribution Piping: Do not use flanges or valves underground. Use the following:

A. 4" NPS (DN100) and Smaller: Soft copper tube, Type K (Type A); wrought-copper, solder-

joint pressure fittings; and soldered joints.

VALVE APPLICATIONS:

Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

A. Shutoff Duty: Use ball or butterfly valves.
B. Throttling Duty: Use ball or butterfly valves.

Grooved-end butterfly valves may be used with grooved-end piping.

PIPING INSTALLATION, GENERAL:

Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping installation.

WATER DISTRIBUTION PIPING INSTALLATION:

Install piping level without pitch.

JOINT CONSTRUCTION:

Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

Grooved Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions. The grooved coupling manufacturer’s factory trained representative shall provide on-site training for contractor’s field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor’s representative is not considered qualified to conduct the training or jobsite visit(s).)

Press-to-Connect Joints: Install Permalynx joints in accordance with the manufacturer’s latest published installation instructions. Prepare and mark tubing ends using a tool supplied by the manufacturer and in accordance with the manufacturer’s instructions.

VALVE INSTALLATION:

Sectional Valves: Install sectional valves close to main on each branch and riser serving plumbing fixtures or equipment, and where indicated. Use ball valves for piping 2" NPS (DN50) and smaller. Use gate or butterfly valves for piping 2-1/2" NPS (DN65) and larger.

Shutoff Valves: Install shutoff valve on each water supply to equipment, on each supply to plumbing fixtures without supply stops, at all main fixture groups, branch lines off main, and where indicated. Use ball valves for piping 2" NPS (DN50) and smaller. Use gate or butterfly valves for piping 2-1/2" NPS (DN65) and larger.

Drain Valves: Install hose-end drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

Balancing Valves: Install in each hot-water circulation return branch, discharge side of each pump and circulator, and where indicated. Refer to Division 15 Section "Plumbing Specialties" for balancing valves.

HANGER AND SUPPORT INSTALLATION

Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

A. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
B. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs 100 feet (30 m) and less.
C. Adjustable roller hangers, MSS Type 43, for individual, straight, horizontal runs longer than 100 feet (30 m).
D. Spring cushion rolls, MSS Type 49, if indicated, for individual, straight, horizontal runs longer than 100 feet (30 m).
E. Pipe rolls, MSS Type 44, for multiple, straight, horizontal runs 100 feet (30 m) or longer. Support pipe rolls on trapeze.
F. Spring hangers, MSS Type 52, for supporting base of vertical runs.

Install supports according to Division 22 Section "Hangers and Supports."

Support vertical piping and tubing at base and at each floor.

Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

Install hangers for copper tubing, steel, and ductile iron with the following maximum spacing:

A. 1-1/2" NPS (DN40) and Smaller: Maximum horizontal spacing, 60 inches (1500 mm); maximum vertical spacing, 10 feet (3 m).
B. 2" through 2-1/2" NPS (DN50 to DN65): Maximum horizontal spacing, 72 inches (1800 mm); maximum vertical spacing, 10 feet (3 m).
C. 3" NPS (DN80) and Larger: Maximum horizontal spacing, 10 feet (3 m); maximum vertical spacing, 10 feet (3 m).

Minimum rod size to be according to manufacturer’s written instructions for service conditions base on maximum hanger spacing.

Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

CONNECTIONS:

Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:

A. Plumbing Fixtures: Connect hot- and cold-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
B. Equipment: Connect hot- and cold-water supply piping as indicated. Provide shutoff valve and union for each connection. Use flanges instead of unions for connections 2-1/2" NPS (DN65) and larger.
C. Water Heaters: Connect cold water supply and hot water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

FIELD QUALITY CONTROL:

Inspect water distribution piping as follows:

A. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
B. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

Test and water distribution piping as follows:

A. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
B. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
C. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 12 hours. Leaks and loss in test pressure constitute defects that must be repaired.
D. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
E. Prepare reports for tests and required corrective action.

CLEANING:

Clean and disinfect service entrance piping and water distribution piping as follows:

A. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.
B. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, procedure described in either AWWA C651 or AWWA C652 or as described below:
   1. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   2. Fill and isolate system according to either of the following:
      a. Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
      b. Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for 3 hours.

   3. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.
   4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.

Prepare and submit reports for purging and disinfecting activities.

Clean interior of piping system. Remove dirt and debris as work progresses.

COMMISSIONING:

Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

Perform the following steps before putting into operation:

A. Close drain valves, hydrants, and hose bibbs.
B. Open shutoff valves to fully open position.
C. Open throttling valves to proper setting.
D. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
E. Remove and clean strainer screens. Close drain valves and replace drain plugs.
F. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.

Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

Check plumbing specialties and verify proper settings, adjustments, and operation.

END OF SECTION

22 11 19 DOMESTIC WATER PIPING SPECIALTIES

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes plumbing specialties for the following:

A. Water distribution systems.

Related Sections include the following:

A. Division 22 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, basic installation requirements, and labeling and identifying requirements; and escutcheons, dielectric fittings, sleeves, and sleeve seals that are not in this Section.
B. Division 22 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.
C. Division 22 Section "Meters and Gages" for thermometers, pressure gages, fittings, and water meters.
D. Division 22 Section "Water Distribution Piping" for water-supply piping and connections.

SYSTEM PERFORMANCE REQUIREMENTS

Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

A. Water Distribution Piping: 125 psig (860 kPa).

SUBMITTALS

Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:

A. Water hammer arresters.
B. Drain valves.
C. Outlet boxes and washer-supply outlets.

Reports: Specified in "Field Quality Control" Article.

QUALITY ASSURANCE

Product Options: Drawings indicate size, profiles, dimensional requirements, and characteristics of plumbing specialties and are based on the specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.

Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

Comply with NFPA 70, "National Electrical Code," for electrical components.

Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.

EXTRA MATERIALS

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

A. Operating Key Handles: Furnish one extra key for every five key-operated hose bibbs and hydrants installed.

PART 2 PRODUCTS

MANUFACTURERS

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

A. Thermostatic Water Mixing Valves:
   1. Leonard Valve Co.
   2. Powers Process Controls.
   3. Symmons Industries, Inc.
   4. T & S Brass and Bronze Works, Inc.

B. Outlet Boxes:
   1. Acorn Engineering Co.
   2. Guy Gray Manufacturing Co., Inc.

C. Water Hammer Arresters:
   1. Josam Co.
   3. Sioux Chief Manufacturing Co., Inc.
   3. Smith: Jay R. Smith Mfg. Co.
   4. Tyler Pipe; Wade Div.
   5. Watts Industries, Inc.; Water Products Div.
   6. Zurn Industries, Inc.; Hydromechanics Div.

THERMOSTATIC WATER MIXING VALVES

General: ASSE 1017, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot- and cold-water-supply inlets, adjustable temperature setting, and capacity at pressure loss as indicated.

A. Bimetal Thermostat, Operation and Pressure Rating: 125 psig (860 kPa) minimum.

Thermostatic Water Mixing Valves: Unit, with the following:

A. Piping, of sizes and in arrangement indicated. Include valves and unions.
B. Piping Component Finish: Polished chrome-plate.
C. Cabinet: Stainless-steel box with stainless-steel hinged door.
D. Cabinet Mounting: Recessed.
E. Thermometer: Manufacturer's standard.

STRAINERS

Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch (1.2-mm) round perforations, unless otherwise indicated.

A. Pressure Rating: 125-psig (860-kPa) minimum steam working pressure, unless otherwise indicated.
B. 2-Inch NPS (DN50) and Smaller: Bronze body, with female threaded ends.
C. 2-1/2-Inch NPS (DN65) and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved epoxy coating and flanged ends.
D. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.
   1. Drain: Factory- or field-installed, hose-end drain valve.
E. T-Pattern Strainers: Malleable-iron or ductile-iron body with grooved ends; access end cap with drain plug and access coupling with rubber gasket.
F. Basket Strainers: Bolted flange or clamp cover, and basket with lift-out handle.
   1. Simplex Type: Single unit, with one basket.
   2. Drain: Factory- or field-installed, hose-end drain valve.

OUTLET BOXES

General: Recessed-mounting outlet boxes with fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

Clothes Washer Outlet Boxes: With hose connections, drain, and the following:

A. Box and Faceplate: Stainless steel.
B. Drain Fitting: 2-inch NPS (DN50) drainage piping P-trap with 2-inch NPS (DN50) standpipe extending from floor to outlet box and 2-inch NPS (DN50) waste.

Ice Maker Outlet Boxes: With hose connection and the following:

A. Box and Faceplate: Stainless steel.
B. Supply Fitting: 1/2-inch NPS (DN15) gate or ball valve and 1/2-inch NPS (DN15) copper, water tubing.

TRAP GUARDS

Trap Sewer Gas and Backup Protection: Smooth, soft, flexible, elastomeric PVC material molded into shape of duck’s bill, open on top with curl closure at bottom. Guard to allow wastewater to discharge through interior and close to original shape after discharge. ASME A112.6.3. NSF/ANSI 14. Sized to match floor drain strainer.

DRAIN VALVES

Hose-End Drain Valves: MSS SP-110, 3/4-inch NPS (DN20) ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include 2-piece, ASTM B 62 bronze body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

A. Inlet: Threaded or solder joint.
B. Outlet: Short-threaded nipple with ASME B1.20.7 garden-hose thread and cap.

MISCELLANEOUS PIPING SPECIALTIES

Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI-WH 201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes A through F and PDI-WH 201 sizes A through F.

Roof Flashing Assemblies: Manufactured assembly made of 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch-(1.6-mm-) thick, lead flashing collar and skirt extending at least 8 inches (200 mm) from pipe with galvanized steel boot reinforcement, and counterflashing fitting.

A. Vent Cap: Open top, without cap.

FLASHING MATERIALS

Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

A. General Use: 4 lb/sq. ft. or 0.0625-inch thickness (20 kg/sq. m or 1.6-mm thickness).
B. Vent Pipe Flashing: 3 lb/sq. ft. or 0.0469-inch thickness (15 kg/sq. m or 1.2-mm thickness).
C. Burning: 6 lb/sq. ft. or 0.0937-inch thickness (30 kg/sq. m or 2.4-mm thickness).

Zinc-Coated Steel Sheet: ASTM A 653 (ASTM A 653M), with 0.20 percent copper content and 0.04-inch (1.016-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1-mm) minimum thickness.

Fasteners: Metal compatible with material and substrate being fastened.

Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 EXECUTION

PLUMBING SPECIALTY INSTALLATION

General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

Install strainers on supply side of each control valve, pressure regulator, and solenoid valve, and where indicated.

Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.

Secure supplies to supports or substrate.

Install individual stop valve in each water supply to plumbing specialties. Use ball or globe valve if specific valve is not indicated.

Install water-supply stop valves in accessible locations.

Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

CONNECTIONS

Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

A. Install piping connections between plumbing specialties and piping specified in other Division 22 Sections.
B. Install piping connections indicated between appliances and equipment specified in other Sections; connect directly to plumbing piping systems.
C. Install piping connections indicated as indirect wastes from appliances and equipment specified in other Sections, to spill over receptors connected to plumbing piping systems.

Install hoses between plumbing specialties and appliances as required for connections.

Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power is specified in Division 26 Sections.

Supply Runouts to Plumbing Specialties: Install hot- and cold-water-supply piping of sizes indicated, but not smaller than required by authorities having jurisdiction.

Ground electric-powered plumbing specialties.

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 26 Sections.

FLASHING INSTALLATION

Fabricate flashing manufactured from single piece unless large pans, sumps, or other drainage shapes are required.

Burn joints of lead sheets where required.

Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

A. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (2500 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
B. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
C. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

Set flashing on floors and roofs in solid coating of bituminous cement.

Secure flashing into sleeve and specialty clamping ring or device.

Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 7 Section "Sheet Metal Flashing and Trim."

Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having caulking recess.

Fabricate and install flashing and pans, sumps, and other drainage shapes as indicated. Install drain connection if indicated.

FIELD QUALITY CONTROL

Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise the field assembly of components and installation of grease recovery units, including piping and electrical connections, and to report results in writing.

A. Test and adjust plumbing specialty controls and safeties. Replace damaged and malfunctioning controls and components.

COMMISSIONING

Before startup, perform the following checks:

A. System tests are complete.
B. Damaged and defective specialties and accessories have been replaced or repaired.
C. Clear space is provided for servicing specialties.

Before operating systems, perform the following steps:

A. Close drain valves, hydrants, and hose bibbs.
B. Open general-duty valves to fully open position.
C. Remove and clean strainers.
D. Verify that drainage and vent piping are clear of obstructions. Flush with water until clear.

Startup Procedures: Follow manufacturer's written instructions. If no procedures are prescribed by manufacturer, proceed as follows:

A. Energize circuits for electrically operated units. Start and run units through complete sequence of operations.

Adjust operation and correct deficiencies discovered during commissioning.

DEMONSTRATION

Startup Services: Engage a factory-authorized service representative to perform startup services and train Owner's maintenance personnel as specified below:

A. Train Owner's maintenance personnel on procedures and schedules related to startup of and servicing interceptors.
B. Train Owner's maintenance personnel on procedures and schedules related to startup of and servicing grease recovery units.
C. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
D. Schedule training with Owner with at least 7 days' advance notice.

PROTECTION

Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

A. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

22 13 16 SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes sanitary drainage and vent piping, and storm drainage piping inside building and to locations indicated.

Related Sections include the following:

A. Division 22 Section "Plumbing Specialties" for drainage and vent piping system specialties.

DEFINITIONS:

Sewerage Piping: Building sewer piping outside building that conveys sanitary sewage from building.

Storm Drainage Piping: Building sewer piping outside building that conveys storm drainage from building.

Service Entrance Piping: Drainage piping at entry into building between outside building sewer piping and inside drainage piping.

Drainage and Vent Piping: Piping inside building that conveys waste water and vapors from fixtures and equipment throughout the building.

Forced-Main Piping: Drainage piping, under pressure.

The following are industry abbreviations for plastic and other piping materials:

A. ABS: Acrylonitrile-butadiene-styrene.
B. EPDM: Ethylene-proplylene-diene polymer, rubber.
C. NBR: Acrylonitrile-butadiene rubber.
D. PVC: Polyvinyl chloride.

SYSTEM PERFORMANCE REQUIREMENTS:

Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

A. Soil, Waste, and Vent Systems: 10-foot head of water (30 kPa).
B. Storm Drainage Systems: 10-foot head of water (30 kPa).
C. Sewage, Forced-Main Piping Systems: 100 psig (690 kPa).

SUBMITTALS:

Test Results and Reports: Specified in "Field Quality Control" Article.

QUALITY ASSURANCE:

Provide listing/approval stamp, label, or other marking on piping made to specified standards.

Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

All cast iron soil pipe and fittings shall be marked with a collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

PART 2 PRODUCTS

PIPES AND TUBES:

General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.

Hub-and-Spigot, Cast-Iron Soil Pipe: ASTM A 74, Service and Extra Heavy classes. Include ASTM C 564 rubber gasket, with dimensions required for pipe class, for each hub.

Hubless, Cast-Iron Soil Pipe: ASTM A 888 or CISPI Standard 301.

Hard Copper Tube: ASTM B306, drainage tube, drawn temper.

PVC Plastic Pipe: ASTM D2665, Schedule 40.

PIPE AND TUBE FITTINGS:

General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.

Threaded-Fitting, End Connections: ASME B1.20.1.

Hub-and-Spigot, Cast-Iron, Soil-Pipe Fittings: ASTM A 74, Service and Extra Heavy classes, hub and spigot. Include ASTM C 564 rubber gasket, with dimensions required for pipe class, for each hub.

Hubless, Cast-Iron, Soil-Pipe Fittings: CISPI Standard 301.

Copper, Solder-Joint Drainage Fittings: ASME B16.23 cast copper or ASME B16.29 wrought copper.

Copper, Solder-Joint Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper. Furnish wrought-copper fittings if indicated.

Copper, Grooved-End Fittings: ASTM B75 (ASTM B75M) copper tube or ASTM B584 bronze castings.

Bronze Flanges: ASME B16.24, Class 150, bronze, with solder-joint end.

Copper Unions: ASME B16.18, cast-copper-alloy, hexagonal-stock body with ball and socket joint, metal to metal seating surfaces, and solder joint, threaded, or solder joint and threaded ends

Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal stock body with ball and socket joint, metal to metal bronze seating surfaces, and female threaded ends with threads according to ASME B1.20.1.

Cast-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.

Cast-Iron, Threaded Drainage Fittings: ASME B16.12, galvanized, recessed, drainage pattern.

Cast-Iron, Threaded Flanges: ASME B16.1, Class 125.

PVC Socket Fittings: ASTM D2665, made to ASTM D3311 drain, waste and vent pipe patterns.

PVC Plastic, Tubular Fittings: ASTM F409 drainage pattern, with ends as required for application.

JOINING MATERIALS:

General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for commonly used joining materials.

Solder: ASTM B 32, Alloy Sn95, Sn94, or E; lead free.

Hubless, Cast-Iron, Soil-Piping Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve or gasket with integral, center pipe stop. Include the following:

A. Heavy-Duty, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel housing or shield; and stainless-steel clamps. Include gasket.
    1. Clamp Width: 3 inches (75 mm) wide with 4 clamps, for piping 1-1/2- to 4-inch NPS (DN40 to DN100).
    2. Clamp Width: 4 inches (100 mm) wide with 6 clamps, for piping 5- to 10-inch NPS (DN125 to DN250).

Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

Flexible, Transition Couplings for Underground, Non-pressure Piping: ASTM C1173 with elastomeric sleeve. Include ends same sizes as piping to be joined and include corrosion-resistant metal band on each end.

Sleeve Type for Plain-End Piping: Rubber or elastomeric sleeve and stainless-steel band assembly, fabricated to match outside diameters of piping to be joined. Include the following:

A. Sleeves for Cast-Iron Soil Piping: ASTM C564 rubber.
B. Sleeves for Plastic Piping: ASTM F477 elastomeric seal.
C. Sleeves for Dissimilar Piping: Compatible with piping materials to be joined.
D. Bands: Stainless-steel, one at each pipe insert.

Gasket Type for Dissimilar-End Piping: Rubber or elastomeric compression gasket, made to match inside diameter of pipe or hub, and outside diameter of adjoining pipe. Include the following:

A. Gaskets for Cast-Iron Piping: ASTM C564 rubber.
B. Gaskets for Plastic Piping: ASTM F477 elastomeric seal.
C. Gaskets for Dissimilar Piping: Compatible with piping materials to be joined.

PART 3 EXECUTION

EXCAVATION:

Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

PIPING APPLICATIONS:

Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

Flanges may be used on aboveground piping, unless otherwise indicated.

Aboveground, Soil, Waste, and Vent Piping: Use the following:

A. 1-1/2" through 10" NPS (DN40 to DN200): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and heavy-duty, Type 304, stainless steel hubless, cast-iron, soil-piping couplings.
B. 1-1/4" through 4" NPS (DN32 to DN100): Hard copper drainage tube; copper, solder-joint drainage fittings; and soldered joints.

Underground, Soil, Waste, Vent, and Storm Drainage Piping: Use the following:

A. 1-1/2" through 12" NPS (DN40 to DN300): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.
B. 2" through 10" NPS (DN50 to DN250): Hub and spigot, cast-iron soil pipe, service class; hub and spigot, cast-iron, soil pipe fittings, service class; and compression joints.
C. 12" through 15" NPS (DN300 to DN375): Hub and spigot, cast-iron soil pipe, extra heavy class; hub and spigot, cast-iron, soil pipe fittings, extra heavy class; and compression joints.

PIPING INSTALLATION, GENERAL:

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation.

DRAINAGE AND VENT PIPING INSTALLATION:

Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

Make changes in direction for drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not make change in direction of flow greater than 90 degrees. Use proper size of standard increasers and reducers if different sizes of piping are connected. Reducing size of drainage piping in direction of flow is prohibited.

Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and

other installation requirements. Maintain swab in piping and pull past each joint as completed.

Install drainage and vent piping at the following minimum slopes, unless otherwise indicated:

A. Sanitary Building Drain: 2 percent downward in direction of flow for piping 3-inch NPS (DN80) and smaller; 1 percent downward in direction of flow for piping 4-inch NPS (DN100) and larger.
B. Horizontal, Sanitary Drainage Piping: 2 percent downward in direction of flow.
C. Storm Building Drain: 1 percent downward in direction of flow.
D. Horizontal, Storm Drainage Piping: 1 percent downward in direction of flow.
E. Vent Piping: 1/2 percent down toward vertical fixture vent or toward vent stack.

Install engineered, sanitary drainage and vent systems in locations indicated and as follows:

A. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
B. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

Sleeves are not required for cast-iron soil piping passing through concrete slab on grade if slab is without membrane waterproofing.

Install PVC plastic drainage piping according to ASTM D2665.

Install underground PVC plastic drainage piping according to ASTM D2321.

JOINT CONSTRUCTION:

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

A. Compression Joints: Make with rubber gasket matching class of pipe and fittings.
B. Hubless Joints: Make with rubber gasket and sleeve or clamp.

PVC Piping Joints: Join drainage piping according to ASTM D2665.

Handling of Solvent Cements, Primers, and Cleaners: Comply with procedures in ASTM F402 for safe handling during joining of plastic pipe and fittings.

HANGER AND SUPPORT INSTALLATION:

Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

A. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
B. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs 100 feet (30 m) and less.

Install supports according to Division 22 Section "Hangers and Supports."

Support vertical piping and tubing at base and at each floor.

Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum

rods.

Install hangers for copper tubing, stainless steel, and ductile-iron with the following maximum spacing:

A. 1-1/2" NPS (DN40) and Smaller: Maximum horizontal spacing, 60 inches (1500 mm); maximum vertical spacing, 10 feet (3 m).
B. 2" through 2-1/2" NPS (DN 50 to DN65): Maximum horizontal spacing, 72 inches (1800 mm); maximum vertical spacing, 10 feet (3 m).
C. 3" NPS (DN80) and Larger: Maximum horizontal spacing, 10 feet (3 m); maximum vertical spacing, 10 feet (3 m).

Install hanger for PVC plastic piping with the following maximum spacing:

A. 8" NPS (DN200) and Smaller: Maximum horizontal spacing, 48 inches (1200 mm); maximum vertical spacing, 10 feet (3 m).

Install hangers for cast-iron soil piping with the following maximum spacing:

A. 1-1/2" through 15" NPS (DN40 to DN375): Maximum horizontal spacing, 60 inches (1500 mm); maximum vertical spacing, 15 feet (4.5 m).

Minimum rod size to be according to manufacturer’s written instructions for service conditions based on maximum hanger spacing.

Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

CONNECTIONS:

Connect service entrance piping to exterior sewerage and drainage piping. Use transition fitting to join dissimilar piping materials.

Connect drainage piping to service entrance piping, and extend to and connect to the following:

A. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
B. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Specialties."
C. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections 2-1/2-inch NPS (DN65) and larger.

FIELD QUALITY CONTROL:

Inspect drainage and vent piping as follows:

A. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
B. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe

tests specified below and to ensure compliance with requirements.

C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

Test drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedure, as follows:

A. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
B. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
C. Roughing-In Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10 feet of head (30 kPa). Water level must not drop for 12 hour duration of test. Inspect joints for leaks.
D. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
E. Repair leaks and defects using new materials and retest piping or portion thereof until satisfactory results are obtained.
F. Prepare reports for tests and required corrective action.

CLEANING AND PROTECTING:

Clean interior of piping system. Remove dirt and debris as work progresses.

Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

Place plugs in ends of uncompleted piping at end of day and when work stops.

Exposed PVC Piping: Protect plumbing vents exposed to sunlight with 2 coats of water-based latex paint.

END OF SECTION

22 13 19 SANITARY WASTE PIPING SPECIALTIES

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes plumbing specialties for the following:

A. Soil, waste, and vent systems.

Related Sections include the following:

A. Division 22 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, basic installation requirements, and labeling and identifying requirements; and escutcheons, dielectric fittings, sleeves, and sleeve seals that are not in this Section.
B. Division 22 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.
C. Division 22 Section "Meters and Gages" for thermometers, pressure gages, fittings, and water meters.
D. Division 22 Section "Water Distribution Piping" for water-supply piping and connections.
E. Division 22 Section "Waste and Vent Piping" for drainage and vent piping and connections.

SYSTEM PERFORMANCE REQUIREMENTS

Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

A. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

SUBMITTALS

Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:

A. Cleanouts.
B. Floor drains, open receptors, and trench drains.
C. Vent caps, vent terminals, and roof flashing assemblies.

Reports: Specified in "Field Quality Control" Article.

QUALITY ASSURANCE

Product Options: Drawings indicate size, profiles, dimensional requirements, and characteristics of plumbing specialties and are based on the specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.

Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

Comply with NFPA 70, "National Electrical Code," for electrical components.

Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.

PART 2 PRODUCTS

MISCELLANEOUS PIPING SPECIALTIES

Roof Flashing Assemblies: Manufactured assembly made of 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch-(1.6-mm-) thick, lead flashing collar and skirt extending at least 8 inches (200 mm) from pipe with galvanized steel boot reinforcement, and counterflashing fitting.

A. Vent Cap: Open top, without cap.

Deep-Seal Traps: Cast iron or bronze, with inlet and outlet matching connected piping, cleanout where indicated, and trap seal primer valve connection where indicated.

A. 2-Inch NPS (DN50): 4-inch- (100-mm-) minimum water seal.
B. 2-1/2 Inch NPS (DN65) and Larger: 5-inch- (125-mm-) minimum water seal.

Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

FLASHING MATERIALS

Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

A. General Use: 4 lb/sq. ft. or 0.0625-inch thickness (20 kg/sq. m or 1.6-mm thickness).
B. Vent Pipe Flashing: 3 lb/sq. ft. or 0.0469-inch thickness (15 kg/sq. m or 1.2-mm thickness).
C. Burning: 6 lb/sq. ft. or 0.0937-inch thickness (30 kg/sq. m or 2.4-mm thickness).

Zinc-Coated Steel Sheet: ASTM A 653 (ASTM A 653M), with 0.20 percent copper content and 0.04-inch (1.016-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1-mm) minimum thickness.

Fasteners: Metal compatible with material and substrate being fastened.

Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

CLEANOUTS

Cleanouts (C.O.): Where plumbing specialties of this designation are indicated, provide products complying with the following:

A. Applicable Standard: ASME A112.36.2M.
B. Products: Subject to compliance with requirements, provide products equal to the following:
   1. Finished Walls: Zurn Z1446-BP bronze plug with stainless steel wall access cover.
   2. Finished Floors: Zurn ZB1400 adjustable floor level cleanout with polished bronze scoriated top flush with floor.
   3. Carpeted Floor: Zurn ZB1400-CM adjustable floor level cleanout with polished bronze top and carpet retainer.
   4. Outside Building: Zurn Z1402 cast iron cleanout extension with bronze plug set in cast iron meter box with cover. Cleanout plug 6" below cover set in concrete.

C. Body or Ferrule Material: Cast iron.
D. Clamping Device: Required.
E. Outlet Connection: Threaded.
F. Closure: Brass plug with straight threads and gasket.
G. Adjustable Housing Material: Cast iron with threads.
H. Frame and Cover Shape: Round.
I. Acceptable Manufacturer's:
   1. Zurn Industries, Inc., Hydromechanics Div.
   2. Josam Co.
   3. Smith: Jay R. Smith Mfg. Co.
   4. Tyler Pipe, Wade Div.
   5. Watts Industries, Inc., Ancon Drain Div.

FLOOR-DRAINS

Floor Drain (2"-FD): Where plumbing specialties of this designation are indicated, provide products complying with the following:

A. Applicable Standard: ASME A112.21.1M.
B. Products: Subject to compliance with requirements, provide products equal to the following:
   1. Zurn ZN415O nickel bronze, raised lip strainer in linoleum or asphaltic tile floors.
   2. Zurn ZN415S nickel bronze square strainer in tile or terrazo floors.
   3. Zurn ZN415E nickel bronze strainer and 4" funnel for drop drains where indicated in construction documents.
   4. Zurn ZN415B nickel bronze strainer for general floor drain. Provide 5" strainer on 2" drains, 6" strainer on 3" drains, and 8" strainer on 4" drains.
   5. Zurn Z610 by boilers, AHU's, etc., with 3/4 grate as marked B.D. in construction documents.
   6. Zurn Z1752-Y-3 in kitchens, stainless steel, 3/4 grate, 10" deep, with aluminum sediment bucket as marked F.S. in construction documents.

C. Body Material: Cast iron.
D. Seepage Flange: Required.
E. Clamping Device: Required.
F. Outlet: Bottom unless otherwise noted.
G. Trap Material: Cast iron or PVC to match connection piping.
H. Trap Pattern: Deep-seal P-trap.
I. Acceptable Manufacturer's:
   1. Zurn Industries, Inc., Hydromechanics Div.
   2. Josam Co.

3. Smith: Jay R. Smith Mfg. Co.
4. Tyler Pipe, Wade Div.
5. Watts Industries, Inc., Ancon Drain Div.

PART 3 EXECUTION

PLUMBING SPECIALTY INSTALLATION

General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of one percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

Install backwater valves in building drain piping as indicated. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

Install expansion joints on vertical risers, stacks, and conductors as indicated.

Install cleanouts in aboveground piping and building drain piping as indicated, and according to Code, according to the following:

A. Size same as drainage piping up to 4-inch NPS (DN100). Use 4-inch NPS (DN100) for larger drainage piping unless larger cleanout is indicated.
B. Locate at each change in direction of piping greater than 135 degrees.
C. Locate at minimum intervals of 100 feet (15 m).
D. Locate at base of each vertical soil and waste stack.

Install cleanout deck plates, of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.

Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor or as indicated. Size outlets as indicated.

Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

A. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
B. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to one percent slope.
C. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.

Secure supplies to supports or substrate.

Install individual stop valve in each water supply to plumbing specialties. Use ball, ~~gate,~~ or globe valve if specific valve is not indicated.

Install water-supply stop valves in accessible locations.

Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

Locate drainage piping as close as possible to bottom of floor slab supporting fixtures and drains, unless indicated otherwise.

Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

CONNECTIONS

Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

A. Install piping connections between plumbing specialties and piping specified in other Division 22 Sections.
B. Install piping connections indicated between appliances and equipment specified in other Sections; connect directly to plumbing piping systems.
C. Install piping connections indicated as indirect wastes from appliances and equipment specified in other Sections, to spill over receptors connected to plumbing piping systems.

Install hoses between plumbing specialties and appliances as required for connections.

Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power is specified in Division 26 Sections.

Drainage Runouts to Plumbing Specialties: Install drainage and vent piping, with approved trap, of sizes indicated, but not smaller than required by authorities having jurisdiction.

Ground electric-powered plumbing specialties.

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 26 Sections.

FLASHING INSTALLATION

Fabricate flashing manufactured from single piece unless large pans, sumps, or other drainage shapes are required.

Burn joints of lead sheets where required.

Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

A. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (2500 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
B. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
C. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

Set flashing on floors and roofs in solid coating of bituminous cement.

Secure flashing into sleeve and specialty clamping ring or device.

Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 7 Section "Sheet Metal Flashing and Trim."

Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having caulking recess.

Fabricate and install flashing and pans, sumps, and other drainage shapes as indicated. Install drain connection if indicated.

FIELD QUALITY CONTROL

Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise the field assembly of components and installation of grease recovery units, including piping and electrical connections, and to report results in writing.

A. Test and adjust plumbing specialty controls and safeties. Replace damaged and malfunctioning controls and components.

PROTECTION

Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

A. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

22 34 00 FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following for domestic water systems:

A. Commercial, gas water heaters.
B. Accessories.

SUBMITTALS

Product Data: For each type and size of water heater. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

Shop Drawings: Detail water heater assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

A. Wiring Diagrams: Power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring.

Product Certificates: Signed by manufacturers of water heaters certifying that products furnished comply with requirements.

Maintenance Data: For water heaters to include in maintenance manuals specified in Division 1.

Warranties: Special warranties specified in this Section.

QUALITY ASSURANCE

Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.

Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on specific units indicated. Other manufacturers' products complying with requirements may be considered. Refer to Division 1 Section "Substitutions."

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

ANSI Compliance: Provide gas water heaters that comply with ANSI standards for gas water heaters and related products and that bear AGA certification label.

ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

WARRANTY

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

PART 2 PRODUCTS

MANUFACTURERS

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

A. Commercial, Storage, Atmospheric-Vent, Gas Water Heaters:
   1. Lochinvar Corp.
   2. Rheem Manufacturing Co.
   3. Smith: A. O. Smith Water Products Co.
   4. State Industries.
   5. Bradford White.

COMMERCIAL, STORAGE, GAS WATER HEATERS

Description: Comply with ANSI Z21.10.3.

Storage Tank Construction: Non-ASME-code steel with 150-psig (1035-kPa) working-pressure rating.

A. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rods, and controls as required. Attach tappings to tank shell before testing and labeling.
   1. NPS 2 (DN50) and Smaller: Threaded ends according to ASME B1.20.1, pipe threads.
   2. NPS 2-1/2 (DN65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

B. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
C. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
D. Jacket: Steel, with enameled finish.

Burner: For use with atmospheric vent water heaters for natural gas fuel.

A. Temperature Control: Adjustable thermostat.
B. Safety Controls: Automatic, high temperature limit and low water cutoff devices or systems.
C. Automatic Ignition: ANSI Z21.20, automatic gas ignition system and components.
D. Automatic Damper: ANSI Z21.66, gas fired appliance, automatic vent damper device.

Anode Rods: Factory installed, magnesium.

Dip Tube: Factory installed. Not required if cold water inlet is near bottom of storage tank.

Drain Valve: ASSE 1005, corrosion resistant metal, factory installed.

WATER HEATER ACCESSORIES

Combination Temperature and Pressure Relief Valves: According to the following:

A. Gas Water Heaters: ANSI Z21.22, combination temperature and pressure relief valve.
B. Gas Shutoff Valves: ANSI Z21.15, manually operated. Furnish for installation in piping.
C. Gas Pressure Regulators: ANSI Z21.18, appliance type, factory or field installed. Include pressure rating, capacity, and pressure differential required for water heater and gas supply.
D. Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.

PART 3 EXECUTION

WATER HEATER INSTALLATION

Install commercial water heaters on concrete bases.

Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

Anchor water heaters to substrate.

Install and connect gas water heaters according to NFPA 54.

Install appliance, gas pressure regulators on gas-burner inlets of water heaters without pressure regulators.

Install vent piping from gas-train pressure regulators and valves to outside of building where required. Terminate vent piping with brass-screened vent cap fitting. Do not combine vents except with approval of authorities having jurisdiction.

Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

Install pressure relief valves in water piping for water heaters without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Plumbing Specialties" for drain valves.

Install thermometers on water heater inlet and outlet piping. Refer to Division 22 Section "Meters and Gages" for thermometers.

Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, and thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Division 22 Section "Valves" for general-duty valves and Division 22 Section "Meters and Gages" for thermometers.

Arrange for insulation on equipment and piping not furnished with factory-applied insulation.

Fill water heaters with water.

CONNECTIONS

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

Install piping adjacent to machine to allow service and maintenance.

Connect hot- and cold-water piping with shutoff valves and unions. Connect hot-water-circulating piping with shutoff valve, check valve, and union.

Connect gas piping to gas burner with drip leg, tee, shutoff valve, and union; minimum size same as inlet connection.

Make connections with dielectric fittings where piping is made of dissimilar metal.

Gas, Water Heater Vent Connections: Connect to vent system. Include draft hoods and diverters where required. Use vents same size as or larger than water heater outlets, but not smaller than indicated unless smaller vent size has been calculated according to NFPA 54. Comply with gas utility requirements for sizing. Gas vents are specified in Division 23 Section "Breechings, Chimneys, and Stacks."

Ground equipment.

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

FIELD QUALITY CONTROL

In addition to manufacturer's written installation and startup checks, perform the following:

A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment and retest until satisfactory results are achieved.
B. Verify that piping system tests are complete.
C. Check for piping connection leaks.
D. Check for clear relief valve inlets, outlets, and drain piping.
E. Test operation of safety controls, relief valves, and devices.
F. Energize electric circuits.
G. Adjust operating controls.
H. Adjust hot-water-outlet temperature settings. Do not set above 120 deg F unless piping system application requires higher temperature.

DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

Train Owner's maintenance personnel on procedures for starting and stopping troubleshooting, servicing, and maintaining equipment.

Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."

Review date in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION

22 40 00 PLUMBING FIXTURES

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes plumbing fixtures and trim, faucets, other fittings, and related components.

Related Sections: The following Sections contain requirements that relate to this Section:

A. Division 7 Section "Joint Sealants" for sealing between fixtures and walls, floors, and counters.
B. Division 22 Section "Valves" for general-duty valves used as supply stops.
C. Division 22 Section "Plumbing Specialties" for backflow preventers and other specialties not specified in this Section.

DEFINITIONS

Accessible: Plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped, disabled, and elderly people.

Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, traps and waste pipes. Pipe fittings, tube fittings, and general-duty valves are included where indicated.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for each plumbing fixture category and type specified. Include selected fixture, trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

Wiring diagrams from manufacturer for electrically operated units.

Maintenance data for plumbing fixtures and components to include in the operation and maintenance manuals specified in Division 1.

QUALITY ASSURANCE

Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category from one source and by a single manufacturer.

Energy Policy Act Requirements: Comply with requirements of all Federal and Public Laws regarding water flow rate and water consumption of plumbing fixtures.

Listing and Labeling: Provide electrically operated fixtures and components specified in this Section that are listed and labeled.

DELIVERY, STORAGE, AND HANDLING

Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

Store plumbing fixtures on elevated platforms in dry location.

PROJECT CONDITIONS

Field Measurements: Coordinate roughing-in and final fixture locations and verify that plumbing fixtures can be installed to comply with original design and referenced standards.

PART 2 PRODUCTS

PLUMBING FIXTURE STANDARDS

Comply with applicable standards below and other requirements specified.

A. Stainless-Steel Fixtures Other than Service Sinks: ASME A112.19.3M.
B. Vitreous-China Fixtures: ASME A112.19.2M.
C. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
D. Water-Closet, Flushometer Tank Trim: ASSE 1037.

LAVATORY/SINK FAUCET STANDARDS

Comply with ASME A112.18.1M and other requirements specified for lavatory, sink, and similar-type-fixture faucet fittings. Include hot- and cold-water indicators; 2.5-gpm- (0.16-L/s-) maximum flow rate; and polished, chrome-plated finish; except where otherwise indicated. Coordinate faucet inlets with supplies and fixture holes and outlet with spout and fixture receptor.

A. Pipe Threads: ASME B1.20.1.
B. Sensor-Actuated Faucets and Electrical Devices: UL 1951.

MISCELLANEOUS FITTING STANDARDS

Comply with ASME A112.18.1M and other requirements specified for fittings, other than faucets. Include polished, chrome-plated finish, except where otherwise indicated. Coordinate fittings with other components and connectors.

A. Atmospheric Vacuum Breakers: ASSE 1001.
B. Brass and Copper, Supplies and Tubular Brass: ASME A112.18.1M.
C. Fixed Flow Restrictors: ASSE 1034.
D. Manual-Operation Flushometers: ASSE 1037.
E. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

MISCELLANEOUS COMPONENT STANDARDS

Comply with applicable standards below and other requirements specified for components for plumbing fixtures, equipment, and appliances.

A. Floor Drains: ASME A112.21.1M.
B. Pipe Threads: ASME B1.20.1.

C. Supply and Drain Insulation Kits: CABO A117.1.
D. Supports: ASME A112.6.1M.

FITTINGS

Fittings for Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for materials for supplies, supply stops, supply risers, traps, and other fittings.

Fittings for Equipment Specified in Other Sections: Fittings include the following:

A. Supply Inlets: Copper tube, size required for final connection.
B. Supply Stops: Chrome-plated brass, angle or straight; compression type; same size as supply inlet and with outlet matching supply riser; loose-key type in exposed installations; wheel-handle type in concealed installations.
C. Supply Risers: 3/8-inch NPS (DN10) flexible copper tube with knob end and chrome-plated tube.
D. Traps: Tubular brass with 0.045-inch (1.1 mm) wall thickness, slip-joint inlet, cleanout, wall flange, escutcheons, and size to match equipment. Use chrome-plated tube for exposed applications.
E. Continuous Waste: Tubular brass, 0.045-inch (1.1-mm) wall thickness, with slip-joint inlet, and size to match equipment.
F. Indirect Waste: Tubular brass, 0.045-inch (1.1-mm) wall thickness, and size to match equipment.

FIXTURE SCHEDULE

P-1 Water Closet – Kohler #K-69057 –white elongated open front seat -Sloan G2 8111-1.6 Optima sensor operated flush valve - 120 VAC / 24 VAC transformer (one transformer can serve up to ten flush valves)

P-2 Lavatory - Kohler #K-2005 - wall hung - vitreous china - 18" x 18" - concealed arm support – Zurn Z6956-XL-W1 battery operated faucet - laminar flow - back checks for hot and cold supply - Sloan MIX-60-A mixing valve - flat stainer drain - supplies with loose key stops - C.P. P-trap - Zurn concealed arm chair carrier - Rim height: 30 inches floor to rim top - 34 inches to rim top on handicap fixtures designated with a "✷".

P-3 Drain Box - Guy Gray model T2000TPPLV - 14"x9-1/4"x3" I.D. - 2" compression angle outlet.

P-4 Faucet - Zurn Z6956-XL-W1 battery operated faucet - laminar flow - back checks for hot and cold supply - Sloan MIX-60-A mixing valve.

P-5 Ice Maker Box - Guy Gray model SSIB1AB – 10-7/8"x8-3/8"x3-1/2" I.D. - ½" FIP inlet - 1/4" compression angle outlet.

Products: Subject to compliance with requirements, provide one of the following manufacturers:

A. Vitreous-China Water Closet, Urinal and Lavatory:
   1. American Standard, Inc.
   2. Eljer Industries.
   3. Kohler Co.
   4. Sloan.
   5. Zurn.

B. Flushometer Valve:

1. Sloan Valve Co. (Regal-Pro).
2. Zurn Industries, Inc.; Flush Valve Operations.

C. Toilet Seat:
1. Bemis Mfg. Co.
2. Centoco Manufacturing Corp.
3. Church Seat Co.
4. Olsonite Co.
5. PlumbTech.

D. Faucet:
1. Chicago Faucet Co.
2. T&S Brass and Bronze Works Inc.
3. Zurn Aquaspec
4. Delta, Cambridge Brass.
5. Sloan.

E. Fitting Insulation Kit: TRUEBRO, Inc. model #102.

PART 3 EXECUTION

EXAMINATION

Examine roughing-in for potable, hot- and cold-water supply piping systems; soil, waste, and vent piping systems; and supports. Verify that locations and sizes of piping and locations and types of supports match those indicated, before installing and connecting fixtures. Use manufacturer's roughing-in data when roughing-in data are not indicated.

Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

Do not proceed until unsatisfactory conditions have been corrected.

APPLICATIONS

Include supports for plumbing fixtures according to the following:

A. Carriers: For wall-hanging water closets and fixtures supported from wall construction.
B. Chair Carriers: For wall-hanging urinals, lavatories, sinks, drinking fountains, and electric water coolers.
C. Reinforcement: For floor-mounted lavatories and sinks that require securing to wall and recessed, box-mounted, electric water coolers.
1. Fabricate reinforcement from 2-by-4-inch or 2-by-6-inch (38-by-89-mm or 38-by-140-mm) fire-retardant-treated-wood blocking between studs or 1/4-by-6-inch (6.35-by-152.4-mm) steel plates attached to studs, in wall construction, to secure fixtures to wall. Include length that will extend beyond ends of fixture mounting bracket and attach to at least 2 studs.
D. Include fitting insulation kits for accessible fixtures according to the following:
1. Cover hot- and cold-water supplies, stops and handles, drain, trap, and waste to wall. Insulation kit to be equal to Truebro model #102.

PLUMBING FIXTURE INSTALLATION

Assemble plumbing fixtures and trim, fittings, faucets, and other components according to manufacturers' written instructions.

Install fixtures level and plumb according to manufacturers' written instructions, roughing-in drawings, and referenced standards.

Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

Install floor-mounted, back-outlet water closets with fittings and gasket seals.

Install toilet seats on water closets.

Install wall-hanging, back-outlet urinals with gasket seals.

Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for handicapped people to reach.

Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate.

Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

Fasten recessed, wall-mounted fittings to reinforcement built into walls.

Fasten counter-mounting plumbing fixtures to casework.

Secure supplies to supports or substrate within pipe space behind fixture.

Install individual stop valve in each water supply to fixture. Use gate or globe valve where specific stop valve is not specified.

A. Exception: Omit stop valves on supplies to emergency equipment, except when permitted by authorities having jurisdiction. When permitted, install valve chained and locked in OPEN position.

Install water-supply stop valves in accessible locations.

Install faucet, laminar-flow fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, except where otherwise indicated.

Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

Seal joints between fixtures and walls, floors, and counters using sanitary-type, 1-part, mildew-resistant, silicone sealant according to sealing requirements specified in Division 7 Section "Joint Sealants." Match sealant color to fixture color.

CONNECTIONS

Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

A. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other Division 22 Sections.

Supply and Waste Connections to Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for fitting sizes and connection requirements for each plumbing fixture.

Supply and Waste Connections to Equipment Specified in Other Sections: Connect equipment with supply inlets, supply stops, supply risers, and traps specified in this Section. Use fitting sizes required to match connected equipment. Connect fittings to plumbing piping.

Ground equipment.

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

Arrange for electric-power connections to fixtures and devices that require power. Electric power is specified in Division 26 Sections.

FIELD QUALITY CONTROL

Verify that installed fixtures are categories and types specified for locations where installed.

Check that fixtures are complete with trim, faucets, fittings, and other specified components.

Inspect installed fixtures for damage. Replace damaged fixtures and components.

Test installed fixtures after water systems are pressurized and demonstrate proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

ADJUSTING AND CLEANING

Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

Adjust water pressure at drinking fountains, electric water coolers, faucets, shower valves, and flushometer valves having controls, to produce proper flow and stream.

Replace washers and seals of leaking and dripping faucets and stops.

Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Include the following:

A. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
B. Remove sediment and debris from drains.

PROTECTION

Provide protective covering for installed fixtures and fittings.

Do not allow use of fixtures for temporary facilities, except when approved in writing by Owner.

END OF SECTION

23 05 05 MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

GENERAL INFORMATION:

The General Requirements and Supplementary Conditions are part of this contract and govern work under this division.

Temporary heating and air conditioning shall be the responsibility of the General Contractor. If the Contractor uses the permanent heating or air conditioning systems for temporary heating or air conditioning, extended warranties will be required on all equipment in use and replace filters in all units once a week. The extended warranties and filter replacement will need to cover the period between when the systems are turned on through Final Acceptance of the building. This shall include boilers, pumps, FPVAV's and AHU's, Etc. At the time of final inspection, if it is found that the interior of ductwork is dirty beyond normal standards, the ductwork systems shall be cleaned at the Contractor's expense.

SCOPE OF WORK:

Work by Mechanical Contractor: Provide all mechanical systems indicated by the drawings, specified or as instructed otherwise. Unless specified otherwise, provide all labor, materials and equipment necessary to provide a complete and operational system.

Work by Electrical Contractor: Provide all line voltage wiring and install items of equipment furnished by the Mechanical, such as thermostats, remote control panels, etc.

Mechanical and Electrical Coordination: The Mechanical will provide to the Electrical all manufacturer's wiring diagrams and installation data and locate all equipment furnished to the Electrical.

Where work or materials are specified or shown on drawings to be performed by more than one Contractor, each such Contractor will be deemed to have figured the item and the Architect will determine who shall furnish the work and who shall submit the credit to the Owner.

Work by General Contractor: Provide all openings and chases with proper framing and reinforcing as required for Mechanical equipment.

Provide access panels or doors where required for mechanical systems.

Provide concrete pads for all base mounted mechanical equipment.

DEFINITIONS:

Contractor: The contractor performing work under this Division of the Specifications.

Provide: Contractor is responsible to furnish and install component completely.

QUALITY ASSURANCE:

Manufacturers: Acceptable manufacturers are listed in applicable sections of the Specifications and on the drawings.

Drawings and Specifications are complimentary. Requirements indicated in either are binding and the most stringent is to be used.

The Contractor is to review documents for the work, and if any discrepancies occur between the work of this Division and the work of another Division, is to notify the Architect and obtain written instructions for any changes necessary. Any changes in the work by this Division made necessary by the failure or neglect of the Contractor to report such discrepancies will be made by, and at the expense of the Contractor.

Changes in Design or Installation: Refer to the General and Supplementary Conditions for requirements pertaining to changes in design and installation. Mechanical installation will otherwise be in accordance with the Contract Drawings and Specifications.

REGULATORY AGENCIES:

Permits and Fees: The Contractor is to pay for all permits and fees as required by Local or State regulatory agencies.

Codes: Work for this project is to comply with Federal, State and Local codes, ordinances and regulations. All work shall comply the latest adopted edition of the Building Code and associated sections of the National Fire Protection Association.

Work shall be done according to applicable codes in cases of conflict between specifications, plans and codes, except where plans and specifications call for higher standards than the codes.

SUBMITTALS AND SHOP DRAWINGS:

Submit product data and copies of shop drawings for all major pieces of equipment as indicated in the respective sections of this Division.

The intent of shop drawing submittals by the Contractor is to demonstrate to the Architect / Engineer that the Contractor understands the design concept and demonstrates his understanding by indicating and detailing the fabrication and installation methods to be used.

If deviations, discrepancies or conflicts between shop drawing submittals and Contract Documents are discovered either prior to or after shop drawing submittals are processed, the design drawings and specifications shall take precedence.

The Architect / Engineer shall review shop drawings for general conformance with the design concept of the project. The review shall not relieve the Contractor of the responsibility of compliance with the contract documents, installation of equipment per manufacturer's requirements, or errors in the shop drawings.

PRODUCT DELIVERY, STORAGE AND HANDLING:

Make provisions for the delivery and safe storage of all material and make the required arrangements with other trades to coordinate moving large pieces of equipment into the building.

Where materials are indicated to be "Furnished by Others" to the Contractor for installation, these materials shall be checked and their delivery properly receipted. After delivery the Contractor assumes all responsibility for the safekeeping of such equipment.

All materials stored outside are to be covered and protected with weatherproof material.

JOB CONDITIONS:

Verify existing site conditions and location prior to bidding.

Verify existing utilities and the actual location of in reference to location of such as shown on drawings. Any deviations between actual conditions and plan locations will be reviewed with the Architect. Repair, patch or terminate utilities encountered in an acceptable manner regardless of whether shown or not.

GUARANTEE:

The Contractor is to guarantee all materials, equipment, workmanship and operation of all systems for a period of one (1) year from the date of final acceptance of the entire project. Guarantee to repair or replace at Contractor's expense any art of the work which may be defective during that time provided that such defect is, in the opinion of the Architect / Engineer, due to imperfect material or workmanship and not to carelessness or improper use.

PART 2 PRODUCTS

STANDARDS FOR EQUIPMENT AND MATERIALS:

All material shall be labeled UL, ETL, AGA or other approved independent testing authority. Air conditioning equipment shall be ARI certified.

All pressure rated vessels shall be provided with an ASME stamp, meeting the ASME Code or the Local Authority, whichever is most stringent.

All materials and equipment shall be of the best quality and be new, unused and without damage.

System design is based upon the first manufacturer listed in the Specifications and the other named manufacturers are considered equivalent. Any costs attributed in changes in ductwork, piping, plumbing, space clearances or other trades is to be borne by the Contractor when another manufacturer is used in lieu of the first listed.

MATERIALS OF APPROVED EQUAL:

Unless request for changes in base bid specifications are received and approved ten (10) days prior to the opening of bids, the successful Contractor will be held to furnish specified items under base bid.

PART 3 EXECUTION

PREPARATION:

Base final installation of all materials and equipment on field dimensions and conditions at the building. The Mechanical Contractor is to inspect all work that affects the work of this Division and report any deficiencies to the General Contractor and Architect. No extra compensation will be allowed on account of minor differences in actual dimensions and those indicated on the plans.

INSTALLATION:

Workmanship: Perform all work in accordance with good commercial practice.

Supervision: The superintendent shall be responsible for the work of this Division and of all subcontractors under this Division. All questions or directions will be directed through the superintendent.

Installation Procedures:

A. Field verify exact location, size, routing, elevation and accessibility of existing and new HVAC and plumbing systems.
B. Properly size and locate all anchors, chases, recesses and openings required for the proper installation of the work.
C. Piping and equipment located in areas subject to low temperatures shall be installed in a manner to prevent freezing.
D. All equipment and materials are to be installed as high as possible.
E. Install equipment and systems in accordance with manufacturer's recommends, accepted industry standards and all applicable Codes.
F. Provide temporary filters in all air systems during construction. Install new clean filters prior to testing and balancing systems. Provide an extra set of filters to Owner at completion of project.

END OF SECTION

23 05 06 BASIC HVAC MATERIALS AND METHODS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

A. Piping materials and installation instructions common to most piping systems.
B. Escutcheons.
C. Dielectric fittings.
D. Flexible connectors.
E. Equipment nameplate data requirements.
F. Labeling and identifying mechanical systems and equipment is specified in Division 23 Section "Identification for HVAC Piping and Equipment".
G. Nonshrink grout for equipment installations.
H. Field-fabricated metal and wood equipment supports.
I. Installation requirements common to equipment specification sections.
J. Mechanical demolition.
K. Cutting and patching.
L. Touchup painting and finishing.

Pipe and pipe fitting materials are specified in Division 23 piping system Sections.

DEFINITIONS:

Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

The following are industry abbreviations for rubber materials:

A. CR: Chlorosulfonated polyethylene synthetic rubber.
B. EPDM: Ethylene propylene diene terpolymer rubber.

SUBMITTALS:

Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

QUALITY ASSURANCE:

Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

DELIVERY, STORAGE, AND HANDLING:

Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

Protect flanges, fittings, and piping specialties from moisture and dirt.

SEQUENCING AND SCHEDULING:

Coordinate mechanical equipment installation with other building components.

Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

Coordinate requirements for access panels and doors if mechanical items requiring access are

concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."

Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Dielectric Unions:
   1. Capitol Manufacturing Co.
   2. Central Plastics Co.
   3. Eclipse, Inc.; Rockford-Eclipse Div.
   4. Epco Sales Inc.
   5. Hart Industries International, Inc.
   6. Watts Industries, Inc.; Water Products Div.
   7. Zurn Industries, Inc.; Wilkins Div.

B. Dielectric Flanges:
   1. Capitol Manufacturing Co.
   2. Central Plastics Co.
   3. Epco Sales Inc.
   4. Watts Industries, Inc.; Water Products Div.

C. Dielectric-Flange Insulating Kits:
   1. Calpico, Inc.
   2. Central Plastics Co.

D. Dielectric Couplings:
   1. Calpico, Inc.
   2. Lochinvar Corp.

E. Dielectric Nipples:
   1. Grinnell Corp.; Grinnell Supply Sales Co.
   2. Perfection Corp.
   3. Victaulic Co. of America.

F. Metal, Flexible Connectors:
   1. ANAMET Industrial, Inc.
   2. Central Sprink, Inc.
   3. Flexicraft Industries.
   4. Flex-Weld, Inc.
   5. Grinnell Corp.; Grinnell Supply Sales Co.
   6. Hyspan Precision Products, Inc.
   7. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
   8. Mercer Rubber Co.
   9. Metraflex Co.

10. Proco Products, Inc.
11. Uniflex, Inc.
12. Flexonics.

G. Mechanical Sleeve Seals:
   1. Calpico, Inc.
   2. Metraflex Co.
   3. Thunderline/Link-Seal.

PIPE AND PIPE FITTINGS:

Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

JOINING MATERIALS:

Refer to individual Division 23 piping Sections for special joining materials not listed below.

Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

A. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, unless thickness or specific material is indicated.
   1. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   2. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

Solder Filler Metals: ASTM B 32.

A. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
B. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

Brazing Filler Metals: AWS A5.8.

A. BCuP Series: Copper-phosphorus alloys.
B. BAg1: Silver alloy.

Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

A. Sleeve: ASTM A 126, Class B, gray iron.
B. Followers: ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 536 ductile iron.
C. Gaskets: Rubber.

D. Bolts and Nuts: AWWA C111.
E. Finish: Enamel paint.

DIELECTRIC FITTINGS:

General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

Insulating Material: Suitable for system fluid, pressure, and temperature.

Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

A. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

FLEXIBLE CONNECTORS:

General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

A. 2-Inch NPS (DN50) and Smaller: Threaded.
B. 2-1/2-Inch NPS (DN65) and Larger: Flanged.
C. Option for 2-1/2-Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.

Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

MECHANICAL SLEEVE SEALS:

Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

PIPING SPECIALTIES:

Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

A. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
B. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
    1. Underdeck Clamp: Clamping ring with set screws.

Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

A. ID: Closely fit around pipe, tube, and insulation of insulated piping.
B. OD: Completely cover opening.
C. Cast Brass: One piece, with set screw.
    1. Finish: Rough brass.
    2. Finish: Polished chrome-plate.

D. Cast Brass: Split casting, with concealed hinge and set screw.
    1. Finish: Rough brass.
    2. Finish: Polished chrome-plate.

E. Stamped Steel: One piece, with set screw and chrome-plated finish.
F. Stamped Steel: One piece, with spring clips and chrome-plated finish.
G. Stamped Steel: Split plate, with concealed hinge, set screw, and chrome-plated finish.
H. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
I. Stamped Steel: Split plate, with exposed-rivet hinge, set screw, and chrome-plated finish.
J. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
K. Cast-Iron Floor Plate: One-piece casting.

GROUT:

Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

A. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
B. Design Mix: 5000-psig (34.5-MPa), 28-day compressive strength.
C. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

PIPING SYSTEMS - COMMON REQUIREMENTS:

General: Install piping as described below, unless piping Sections specify otherwise. Individual

Division 23 piping Sections specify unique piping installation requirements.

General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

Install piping at indicated slope.

Install components with pressure rating equal to or greater than system operating pressure.

Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

Install piping free of sags and bends.

Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.

Locate groups of pipes parallel to each other, spaced to permit valve servicing.

Install fittings for changes in direction and branch connections.

Install couplings according to manufacturer's written instructions.

Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

A. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
B. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
C. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
D. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
E. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

Sleeves are not required for core drilled holes.

Permanent sleeves are not required for holes formed by PE removable sleeves.

Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

A. Cut sleeves to length for mounting flush with both surfaces.

1. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

B. Build sleeves into new walls and slabs as work progresses.
C. Install sleeves large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
   1. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
   2. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger, penetrating gypsum-board partitions.
   3. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
      a. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

D. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Section "Joint Sealants" for materials.
E. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

Verify final equipment locations for roughing-in.

Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   2. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
   3. Align threads at point of assembly.
   4. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
   5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
G. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

Piping Connections: Make connections according to the following, unless otherwise indicated:

A. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
B. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
C. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
D. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

EQUIPMENT INSTALLATION - COMMON REQUIREMENTS:

Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

Install equipment giving right of way to piping installed at required slope.

Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

PAINTING AND FINISHING:

Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

Apply paint to exposed piping according to the following, unless otherwise indicated:

A. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
B. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.

C. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
D. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
E. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
F. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

Do not paint piping specialties with factory-applied finish.

Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

CONCRETE BASES:

Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

ERECTION OF METAL SUPPORTS AND ANCHORAGE:

Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

ERECTION OF WOOD SUPPORTS AND ANCHORAGE:

Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

Attach to substrates as required to support applied loads.

DEMOLITION:

Disconnect, demolish, and remove Work specified in Division 23 Sections.

If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.

Removal: Remove indicated equipment from Project site.

Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

CUTTING AND PATCHING:

Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

Repair cut surfaces to match adjacent surfaces.

GROUTING:

Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

Clean surfaces that will come into contact with grout.

Provide forms as required for placement of grout.

Avoid air entrapment during placing of grout.

Place grout, completely filling equipment bases.

Place grout on concrete bases to provide smooth bearing surface for equipment.

Place grout around anchors.

Cure placed grout according to manufacturer's written instructions.

END OF SECTION

23 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes hangers and supports for mechanical system piping and equipment.

Related Sections include the following:

A. Division 5 Section "Metal Fabrications" for materials for attaching hangers and supports to building structure.

DEFINITIONS:

MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

PERFORMANCE REQUIREMENTS:

Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

SUBMITTALS:

Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.

Welding Certificates: Copies of certificates for welding procedures and operators.

QUALITY ASSURANCE:

Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support and trapeze by a qualified professional engineer.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Pipe Hangers:
   1. AAA Technology and Specialties Co., Inc.
   2. B-Line Systems, Inc.
   3. Erico.
   4. Globe Pipe Hanger Products, Inc.
   5. Grinnell Corp.
   6. GS Metals Corp.
   7. National Pipe Hanger Corp.
   8. PHD Manufacturing, Inc.
   9. PHS Industries, Inc.
   10. Piping Technology & Products, Inc.

B. Channel Support Systems:
   1. B-Line Systems, Inc.
   2. Erico.
   3. Grinnell Corp.; Power-Strut Unit.
   4. GS Metals Corp.
   5. National Pipe Hanger Corp.
   6. Thomas & Betts Corp.
   7. Unistrut Corp.

C. Thermal-Hanger Shield Inserts:
   1. PHS Industries, Inc.
   2. Pipe Shields, Inc.
   3. Rilco Manufacturing Co., Inc.
   4. Value Engineered Products, Inc.

D. Powder-Actuated Fastener Systems:
   1. Gunnebo Fastening Corp.
   2. Hilti, Inc.
   3. ITW Ramset/Red Head.
   4. Masterset Fastening Systems, Inc.

MANUFACTURED UNITS:

Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

A. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

A. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.

A. Material for Piping: ASTM C 552, Type I cellular glass or high density polyisocyanurate insulation.
B. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
C. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield.

MISCELLANEOUS MATERIALS:

Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.

A. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
B. Properties: Nonstaining, noncorrosive, and nongaseous.
C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

HANGER AND SUPPORT APPLICATIONS:

Specific hanger requirements are specified in Sections specifying equipment and systems.

Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

All hangers are to be sized to allow for continuous installation of insulation and thermal insulation shield. Hangers are to sized to match the O.D. of insulated pipes or O.D. of uninsulated pipes.

Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).
B. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8 (DN20 to DN200).
C. Roof Pillow Block Pipestands: Adjustable height roller bearing pipe support. Self-lubricated polycarbonate roller polycarbonate resin rod. Pipe support base of polycarbonate or stainless steel.

Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system

Specification Sections, install the following types:

A. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
B. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.

Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
B. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
C. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
D. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
E. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
B. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
C. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
D. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
E. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
F. C-Clamps (MSS Type 23): For structural shapes.
G. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
H. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
I. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
J. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
K. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
L. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    1. Light (MSS Type 31): 750 lb (340 kg).
    2. Medium (MSS Type 32): 1500 lb (675 kg).
    3. Heavy (MSS Type 33): 3000 lb (1350 kg).

M. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
N. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
O. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where head room is limited.

Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

A. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
B. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
C. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, high density polyisocyanurate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

HANGER AND SUPPORT INSTALLATION:

Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

Insulated Piping: Comply with the following:

A. Attach clamps and spacers to piping.
   1. Use thermal-hanger shield insert with clamp sized to match OD of insert.
   2. Do not exceed pipe stress limits according to ASME B31.9.

B. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.

C. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall

span arc of 180 degrees.
1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.

D. Shield Dimensions for Pipe: Not less than the following:
1. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
2. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
3. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
4. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
5. NPS 16 to NPS 24 (DN400 to DN600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.

E. Pipes NPS 8 (DN200) and Larger: Include wood inserts.
F. Insert Material: Length at least as long as protective shield.
G. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

EQUIPMENT SUPPORTS:

Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

Grouting: Place grout under supports for equipment and make smooth bearing surface.

METAL FABRICATION:

Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

A. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
B. Obtain fusion without undercut or overlap.
C. Remove welding flux immediately.
D. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

ADJUSTING:

Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

END OF SECTION

23 05 93 TESTING AND BALANCING

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:

A. Balancing airflow and water flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
A. Adjusting total HVAC systems to provide indicated quantities.
B. Measuring electrical performance of HVAC equipment.
C. Setting quantitative performance of HVAC equipment.
D. Verifying that automatic control devices are functioning properly.
E. Reporting results of the activities and procedures specified in this Section.

Related Sections include the following:

A. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
B. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

DEFINITIONS:

Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.

Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

Report Forms: Test data sheets for recording test data in logical order.

Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

Test: A procedure to determine quantitative performance of a system or equipment.

Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.

AABC: Associated Air Balance Council.

AMCA: Air Movement and Control Association.

CTI: Cooling Tower Institute.

NEBB: National Environmental Balancing Bureau.

SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

SUBMITTALS:

Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.

Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3 of this Section.

Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

Sample Report Forms: Submit 2 sets of sample testing, adjusting, and balancing report forms.

Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

QUALITY ASSURANCE:

Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.

Testing, Adjusting, and Balancing Conference: Meet with the Owner's and the Architect's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days' advance notice of scheduled meeting time and location.

A. Agenda Items: Include at least the following:
   1. Submittal distribution requirements.
   2. Contract Documents examination report.
   3. Testing, adjusting, and balancing plan.
   4. Work schedule and Project site access requirements.
   5. Coordination and cooperation of trades and subcontractors.
   6. Coordination of documentation and communication flow.

Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:

A. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
B. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.

Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."

Testing, Adjusting, and Balancing Reports: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

PROJECT CONDITIONS:

Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

COORDINATION:

Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.

Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

WARRANTY:

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

A. The certified Agent has tested and balanced systems according to the Contract Documents.
B. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 PRODUCTS

CONTRACTORS:

Contractors: Subject to compliance with requirements, provide services by one of the following:

A. Testing, Balancing and Controls:
   1. QTAB.
   2. EMC2.
   3. Pro Balance.
   4. PEC Field Services.

PART 3 EXECUTION

EXAMINATION:

Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.

A. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
B. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

Examine approved submittal data of HVAC systems and equipment.

Examine project record documents described in Division 1 Section "Project Record Documents."

Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

Examine system and equipment test reports.

Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

PREPARATION:

Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

Complete system readiness checks and prepare system readiness reports. Verify the following:

A. Permanent electrical power wiring is complete.
~~B. Hydronic systems are filled, clean, and free of air.~~
C. Automatic temperature-control systems are operational.
D. Equipment and duct access doors are securely closed.
E. Balance, smoke, and fire dampers are open.
F. ~~Isolating and balancing valves are open and control valves are operational~~.
G. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
H. Windows and doors can be closed so design conditions for system operations can be met.

GENERAL TESTING AND BALANCING PROCEDURES:

Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.

Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES:

Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

Prepare schematic diagrams of systems' "as-built" duct layouts.

Determine the best locations in main and branch ducts for accurate duct airflow measurements.

Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

Verify that motor starters are equipped with properly sized thermal protection.

Check dampers for proper position to achieve desired airflow path.

Check for airflow blockages.

Check condensate drains for proper connections and functioning.

Check for proper sealing of air-handling unit components.

CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES:

The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems. Additional procedures are required for variable-air-volume, multizone, dual-duct, induction-unit supply-air systems and process exhaust-air systems. These additional procedures are specified in other articles in this Section.

Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.

A. Measure fan static pressures to determine actual static pressure as follows:
   1. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
   2. Measure static pressure directly at the fan outlet or through the flexible connection.
   3. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
   4. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

B. Measure static pressure across each air-handling unit component.
   1. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

C. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers under final balanced conditions.
D. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
E. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
F. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-

motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.

Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.

A. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
   1. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

B. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.

Measure terminal outlets and inlets without making adjustments.

A. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.

Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.

A. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
B. Adjust patterns of adjustable outlets for proper distribution without drafts.

MOTORS:

Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

A. Manufacturer, model, and serial numbers.
B. Motor horsepower rating.
C. Motor rpm.
D. Efficiency rating if high-efficiency motor.
E. Nameplate and measured voltage, each phase.
F. Nameplate and measured amperage, each phase.
G. Starter thermal-protection-element rating.

Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

CONDENSING UNITS:

Verify proper rotation of fans and measure entering- and leaving-air temperatures. Record compressor data.

TEMPERATURE TESTING:

During testing, adjusting, and balancing, report need for adjustment in temperature regulation

within the automatic temperature-control system.

Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

Measure outside-air, wet- and dry-bulb temperatures.

TOLERANCES:

Set HVAC system airflow and water flow rates within the following tolerances:

A. Supply, Return, and Exhaust Fans: Plus 5 to plus 10 percent.
B. Air Outlets and Inlets: 0 to minus 10 percent.
C. Heating-Water Flow Rate: 0 to minus 10 percent.
D. Cooling-Water Flow Rate: 0 to minus 5 percent.

FINAL REPORT:

General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.

Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

A. Include a list of the instruments used for procedures, along with proof of calibration.

Final Report Contents: In addition to the certified field report data, include the following:

A. Fan curves.
B. Manufacturers' test data.
C. Field test reports prepared by system and equipment installers.
D. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:

A. Title page.
B. Name and address of testing, adjusting, and balancing Agent.
C. Project name.
D. Project location.
E. Architect's name and address.
F. Engineer's name and address.
G. Contractor's name and address.
H. Report date.
I. Signature of testing, adjusting, and balancing Agent who certifies the report.
J. Summary of contents, including the following:
    1. Design versus final performance.
    2. Notable characteristics of systems.
    3. Description of system operation sequence if it varies from the Contract Documents.

K. Nomenclature sheets for each item of equipment.
L. Data for terminal units, including manufacturer, type size, and fittings.

M. Notes to explain why certain final data in the body of reports vary from design values.
N. Test conditions for fans and pump performance forms, including the following:
    1. Settings for outside-, return-, and exhaust-air dampers.
    2. Conditions of filters.
    3. Cooling coil, wet- and dry-bulb conditions.
    4. Fan drive settings, including settings and percentage of maximum pitch diameter.
    5. Settings for supply-air, static-pressure controller.
    6. Other system operating conditions that affect performance.

System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:

A. Quantities of outside, supply, return, and exhaust airflows.
B. Water and steam flow rates.
C. Duct, outlet, and inlet sizes.

Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

A. Unit Data: Include the following:
    1. Unit identification.
    2. Location.
    3. Make and type.
    4. Model number and unit size.
    5. Manufacturer's serial number.
    6. Unit arrangement and class.
    7. Discharge arrangement.
    8. Sheave make, size in inches (mm), and bore.
    9. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
    10. Number of belts, make, and size.
    11. Number of filters, type, and size.

B. Motor Data: Include the following:
    1. Make and frame type and size.
    2. Horsepower and rpm.
    3. Volts, phase, and hertz.
    4. Full-load amperage and service factor.
    5. Sheave make, size in inches (mm), and bore.
    6. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).

C. Test Data: Include design and actual values for the following:
    1. Total airflow rate in cfm (L/s).
    2. Total system static pressure in inches wg (Pa).
    3. Fan rpm.
    4. Discharge static pressure in inches wg (Pa).
    5. Filter static-pressure differential in inches wg (Pa).
    6. Preheat coil static-pressure differential in inches wg (Pa).
    7. Cooling coil static-pressure differential in inches wg (Pa).
    8. Heating coil static-pressure differential in inches wg (Pa).
    9. Outside airflow in cfm (L/s).
    10. Return airflow in cfm (L/s).
    11. Outside-air damper position.
    12. Return-air damper position.
    13. Vortex damper position.

Fan Test Reports: For supply, return, and exhaust fans, include the following:

A. Fan Data: Include the following:
   1. System identification.
   2. Location.
   3. Make and type.
   4. Model number and size.
   5. Manufacturer's serial number.
   6. Arrangement and class.
   7. Sheave make, size in inches (mm), and bore.
   8. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).

B. Motor Data: Include the following:
   1. Make and frame type and size.
   2. Horsepower and rpm.
   3. Volts, phase, and hertz.
   4. Full-load amperage and service factor.
   5. Sheave make, size in inches (mm), and bore.
   6. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
   7. Number of belts, make, and size.

C. Test Data: Include design and actual values for the following:
   1. Total airflow rate in cfm (L/s).
   2. Total system static pressure in inches wg (Pa).
   3. Fan rpm.
   4. Discharge static pressure in inches wg (Pa).
   5. Suction static pressure in inches wg (Pa).

Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

A. Report Data: Include the following:
   1. System and air-handling unit number.
   2. Location and zone.
   3. Traverse air temperature in deg F (deg C).
   4. Duct static pressure in inches wg (Pa).
   5. Duct size in inches (mm).
   6. Duct area in sq. ft. ((sq. m)).
   7. Design airflow rate in cfm (L/s).
   8. Design velocity in fpm (m/s).
   9. Actual airflow rate in cfm (L/s).
   10. Actual average velocity in fpm (m/s).
   11. Barometric pressure in psig (Pa).

Instrument Calibration Reports: For instrument calibration, include the following:

A. Report Data: Include the following:
   1. Instrument type and make.
   2. Serial number.
   3. Application.
   4. Dates of use.
   5. Dates of calibration.

END OF SECTION

23 07 13 DUCT INSULATION

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

Related Sections include the following:

A. Division 7 Section "Firestopping" for firestopping materials and requirements for penetrations through fire and smoke barriers.
B. Division 23 Section "Equipment Insulation" for insulation materials and application for pumps, tanks, hydronic specialties, and other equipment.
C. Division 23 Section "Pipe Insulation" for insulation for piping systems.
D. Division 23 Section "Metal Ducts" for duct liner.

SUBMITTALS:

Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

Shop Drawings: Show fabrication and installation details for the following:

A. Removable insulation sections at access panels.
B. Application of field-applied jackets.
C. Applications at linkages for control devices.

Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

QUALITY ASSURANCE:

Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

A. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

B. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

DELIVERY, STORAGE, AND HANDLING:

Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

COORDINATION:

Coordinate clearance requirements with duct Installer for insulation application.

SCHEDULING:

Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Mineral-Fiber Insulation:
   1. CertainTeed Manson.
   2. Knauf FiberGlass GmbH.
   3. Owens-Corning Fiberglas Corp.
   4. John Manville.

INSULATION MATERIALS:

Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

FIELD-APPLIED JACKETS:

General: ASTM C 921, Type 1, unless otherwise indicated.

Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

ACCESSORIES AND ATTACHMENTS:

Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd. (270 g/sq. m).

A. Tape Width: 4 inches (100 mm).

Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:

A. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
B. Galvanized Steel: 0.005 inch (0.13 mm) thick.
C. Aluminum: 0.007 inch (0.18 mm) thick.

Wire: 0.080-inch (2.0-mm), nickel-copper alloy; 0.062-inch (1.6-mm), soft-annealed, stainless steel; or 0.062-inch (1.6-mm), soft-annealed, galvanized steel.

Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.

A. Welded Pin Holding Capacity: 100 lb (45 kg) for direct pull perpendicular to the attached surface.

Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

A. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb (45 kg) for direct pull perpendicular to the adhered surface.

Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

VAPOR RETARDERS:

Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

EXAMINATION:

Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION:

Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

GENERAL APPLICATION REQUIREMENTS:

Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.

Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

Apply multiple layers of insulation with longitudinal and end seams staggered.

Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

Keep insulation materials dry during application and finishing.

Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

Apply insulation with the least number of joints practical.

Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

Apply insulation with integral jackets as follows:

A. Pull jacket tight and smooth.
B. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
C. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.

Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.

Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.

A. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
B. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.

Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

A. Seal penetrations with vapor-retarder mastic.
B. Apply insulation for exterior applications tightly joined to interior insulation ends.
C. Seal insulation to roof flashing with vapor-retarder mastic.

Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for

fire-rated wall and partition penetrations.

Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

A. For insulation indicated to have vapor retarders, taper termination and seal insulation ends with vapor-retarder mastic.

MINERAL-FIBER INSULATION APPLICATION:

Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.

A. Apply adhesives according to manufacturer's recommended coverage rates per square foot.
A. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
B. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    1. On duct sides with dimensions 18 inches (450 mm) and smaller, along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    2. On duct sides with dimensions larger than 18 inches (450 mm). Space 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
    3. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    4. Do not overcompress insulation during installation.

C. Impale insulation over anchors and attach speed washers.
D. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
E. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch (13-mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
F. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches (450 mm) o.c.
G. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
H. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch- (150-mm-) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
I. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

A. Apply adhesives according to manufacturer's recommended coverage rates per square foot.
B. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
C. Space anchor pins as follows:
    1. On duct sides with dimensions 18 inches (450 mm) and smaller, along longitudinal

centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
2. On duct sides with dimensions larger than 18 inches (450 mm). Space 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
3. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
4. Do not overcompress insulation during installation.

D. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
E. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch (13-mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
F. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
G. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch- (150-mm-) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
H. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

DUCT SYSTEM APPLICATIONS:

Insulation materials and thicknesses are specified in schedules at the end of this Section.
Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.

Insulate the following plenums and duct systems:

A. Indoor concealed supply-, return-, and outside-air ductwork.
B. Indoor exposed supply-, return-, and outside-air ductwork.

Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

A. Fibrous-glass ducts.
B. Metal ducts with duct liner.
C. Factory-insulated flexible ducts.
D. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
E. Flexible connectors.
F. Vibration-control devices.
G. Testing agency labels and stamps.
H. Nameplates and data plates.
I. Access panels and doors in air-distribution systems.

INDOOR DUCT AND PLENUM APPLICATION SCHEDULE:

Service: Rectangular, low pressure supply and return-air ducts are to be lined. Reference Section 23 31 13.

Service: Round, supply-air ducts, concealed.

A. Material: Mineral-fiber blanket.
B. Thickness: 1-1/2 inches (38 mm).
C. Number of Layers: One.
D. Field-Applied Jacket: Foil and paper.
E. Vapor Retarder Required: Yes.

Service: Round, supply-air ducts, exposed.

A. Material: Mineral-fiber blanket.
B. Thickness: 1-1/2 inches (38 mm).
C. Number of Layers: One.
D. Field-Applied Jacket: Foil and paper.
E. Vapor Retarder Required: Yes.

END OF SECTION

23 11 23 NATURAL-GAS PIPING

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes fuel gas piping, specialties, and accessories within the building.

Related Sections include the following:

A. Division 33 Section "Natural Gas Distribution" for natural gas service piping, specialties, and accessories outside the building.
B. Division 23 Section "Meters and Gages" for pressure gages.

PROJECT CONDITIONS:

Gas System Pressures: Two pressure ranges. Primary pressure is more than 0.5 psig (3.45 kPa) but not more than 2.0 psig (13.8 kPa), and is reduced to secondary pressure of 0.5 psig (3.45 kPa) or less.

SUBMITTALS:

Product Data: For the Following:

A. Specialty valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.

Field Test Reports: Indicate and interpret test result for compliance with performance requirements.

Maintenance Data: For natural gas specialties and accessories to include in maintenance manuals specified in Division 1.

QUALITY ASSURANCE:

Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."

UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

COORDINATION:

Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

A. Notify Owner/Architect not less than two days in advance of proposed utility interruptions.
B. Do not proceed with utility interruptions without Architect's written permission.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Appliance Connector Valves
   1. Conbraco Industries, Inc.; Apollo Division
   2. Jomar International, Ltd.
   3. McDonald: A.Y. McDonald Mfg. Co.
   4. Mueller Co.; Mueller Gas Products Division
   5. Watts Industries, Inc.; Water Products Division

B. Gas Valves, NPS 2(DN 50) and Smaller
   1. Crane Valves
   2. Flow Control Equipment, Inc.
   3. Honeywell, Inc.
   4. Jomar International, Ltd.
   5. McDonald: A.Y. McDonald Mfg. Co.
   6. Milwaukee Valve Co., Inc.
   7. Mueller Co.; Mueller Gas Products Division
   8. Nibco, Inc.
   9. Watts Industries, Inc.; Water Products Division

C. Plug Valves, NPS 2-1/2 (DN 65) and Larger
   1. Flow Control Equipment, Inc.
   2. Milliken Valve Co., Inc.
   3. Nordstrom Valves, Inc.

D. Line Pressure Regulators
   1. American Meter Co.
   2. Fisher Controls International, Inc.
   3. Maxitrol Co.
   4. National Meter

E. Appliance Pressure Regulators
   A. Eaton Corporation; Controls Division
   B. Maxitrol Co.

PIPING MATERIALS:

Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

PIPES, TUBES, FITTINGS, AND JOINING MATERIALS:

Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.

A. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.

B. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
C. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
D. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
E. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
F. Joint Compound and Tape: Suitable for natural gas.
G. Steel Flanges and Flanged Fittings: ASME B16.5.
H. Gasket Material: Thickness, material, and type suitable for natural gas.

Transition Fittings: Type, material, and end connections to match piping being joined.

Common Joining Materials: Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

PIPING SPECIALTIES:

Flexible Connectors: ANSI Z21.24, copper alloy.

SPECIALTY VALVES:

Valves, NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

Valves, NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

Appliance Connector Valves: ANSI Z21.15 and IAS listed.

Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2 psig (13.8 kPa) minimum pressure rating.

Gas Valves, NPS 2 (DN 50) and Smaller: ASME B16.33 and IAS-listed bronze body and 125 psig (860 kPa) pressure rating.

A. Tamperproof Feature: Include design for locking.

Plug Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125 psig (860 kPa) pressure rating.

A. Tamperproof Feature: Include design for locking.

General-Duty Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38, cast-iron body, suitable for fuel gas service, with "WOG" indicated on valve body, and 125 psig (860 kPa) pressure rating.

A. Gate Valves: MSS SP-70, OS&Y type with solid wedge.
B. Butterfly Valves: MSS SP-67, lug type with lever handle.

PRESSURE REGULATORS:

Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.

A. NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
C. Service Pressure Regulators: ANSI Z21.80. Include 100 psig (690 kPa) minimum inlet pressure rating.
D. Line Pressure Regulators: ANSI Z21.80 with 2 psig (13.8 kPa) minimum inlet pressure rating.
E. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

Pressure Regulator Vents: Factory- or field -installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 EXECUTION

PREPARATION:

Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

Comply with ANSI Z223.1, "Prevention of Accidental Ignition" Paragraph.

PIPING APPLICATIONS:

Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

Fuel Gas Piping 5 psig (3.45 kPa) or Less: Use the following:

A. NPS ½ (DN 15) and Smaller: NPS 3/4 (DN 20) steel pipe, malleable-iron threaded fittings, and threaded joints.
B. NPS 3/4 and NPS 1 (DN 20 and DN 25): Steel pipe, malleable-iron threaded fittings, and threaded joints.
C. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): Steel pipe, malleable-iron threaded fittings, and threaded joints.
D. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): Steel pipe, steel welding fittings, and welded joints.
E. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel welding fittings, and welded joints.

VALVE APPLICATIONS:

Appliance Shutoff Valves for Pressure 0.5 psig (3.45 kPa) or Less: Appliance connector valve or gas stop.

Appliance Shutoff Valves for Pressure 0.5 to 2 psig (3.45 to 13.8 kPa): Gas stop or gas valve.

Appliance Shutoff Valves for Pressure 2 to 5 psig (13.8 to 34.5 kPa): Gas valve.

Piping Line Valves, NPS 2 (DN 50) and Smaller: Gas valve.

Piping Line Valves, NPS 2-1/2 (DN 65) and Larger: Plug valve or general-duty valve.

Valves at Service Meter, NPS 2(DN 50) and Smaller: Gas valve.

Valves at Service Meter, NPS 2-1/2 (DN 65) and Larger: Plug valve.

PIPING INSTALLATION:

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.

Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

A. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums.
B. In Floor Channels: Gas piping may be installed in floor channels, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
C. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
D. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.
E. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    1. Exception: Accessible above-ceiling space specified above.

Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Connect branch piping from top or side of horizontal piping.

Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

Install pressure gage upstream and downstream from each line pressure regulator.

Install flanges on valves, specialties, and equipment having NPS 2-1/2 (DN 65) and larger connections.

Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

JOINT CONSTRUCTION:

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

Use materials suitable for fuel gas.

HANGER AND SUPPORT INSTALLATION:

Refer to Division 23 Section "Hangers and Supports" for pipe hanger and support devices.

Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

A. NPS 1-1/2 (DN 25) and Smaller: Maximum span, 5'0" (2438 mm).
B. NPS 2 (DN 100) and Larger: Maximum span, 10' (3 m). Minimum rod size to be per manufacturer's written instructions for service conditions based on maximum hanger spacing.

CONNECTIONS:

Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

Install piping adjacent to appliances to allow service and maintenance.

Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72" (1800 mm) of each appliance. Install union downstream from valve.

Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

Ground Equipment:

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
B. Do not use gas pipe as grounding electrode.

LABELING AND IDENTIFYING:

Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each service meter, pressure regulator, and specialty valve.

A. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
B. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for nameplates and signs.

PAINTING:

Use materials and procedures in Division 9 Section "Painting," "Exterior Paint Schedule" Article, "Ferrous Metal" Paragraph, "Full-Gloss, Alkyd-Enamel Finish" Subparagraph.

Paint exterior service meters, pressure regulators, and specialty valves.

A. Color: Gray

FIELD QUALITY CONTROL:

Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction.

Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

Report test results promptly and in writing to Architect and authorities having jurisdiction.

Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.

Verify correct pressure settings for pressure regulators.

Verify that specified piping tests are complete.

ADJUSTING:

Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION

23 23 00 REFRIGERANT PIPING

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes refrigerant piping used for air-conditioning applications, including pipes, tubing, fittings, and specialties; special-duty valves; and refrigerants.

Related Sections: The following Sections contain requirements that relate to this Section:

A. Division 7 Section "Roof Accessories" for roof curbs, piping supports, and roof penetration boots.
B. Division 7 Section "Joint Sealants" for materials and methods for sealing pipe penetrations through basement walls and fire/smoke barriers.
C. Division 23 Section "Mechanical Identification" for labeling and identifying refrigerant piping.
D. Division 23 Section "Mechanical Insulation" for pipe insulation.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for each valve type and refrigerant piping specialty specified.

Shop Drawings showing layout of refrigerant piping, specialties, and fittings, including pipe and tube sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.

A. Refrigerant piping indicated is schematic only. Size and design the layout and installation of the piping, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and conformance with warranties of connected equipment.

Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

Maintenance data for refrigerant valves and piping specialties to include in the operation and maintenance manual specified in Division 1 Sections and Division 23 Section "Basic Mechanical Requirements."

QUALITY ASSURANCE

ASME Compliance: Qualify brazing and welding processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications."

Regulatory Requirements: Comply with provisions of the following codes:

A. ASME B31.5, "Refrigeration Piping."

B. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."
D. Listing and Labeling: Provide products specified in this Section that are UL listed and labeled.

SEQUENCING AND SCHEDULING

Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 7 Sections.

PART 2 PRODUCTS

MANUFACTURERS

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

A. Refrigerants:
   1. Allied Signal Inc.; Genetron Refrigerants.
   2. DuPont Company; Fluorochemicals Div.
   3. Elf Atochem North America, Inc.
   4. ICI Americas Inc.; Fluorochemicals Bus.

B. Refrigerant Valves and Specialties:
   1. Danfoss Electronics, Inc.
   2. Eaton Corporation; Industrial Control Div.
   3. Emerson Electric Company; Alco Controls Div.
   4. Henry Valve Company.
   5. Parker-Hannifin Corp.; Refrigeration & Air Conditioning Division.
   6. Sporlan Valve Company.

PIPES AND TUBES

Hard Copper Tube: ASTM B 280, Type ACR, drawn temper.

Soft Copper Tube: ASTM B 280, Type ACR, annealed temper.

PIPE AND TUBE FITTINGS

Copper Fittings: ASME B16.22, wrought-copper streamlined pattern.

JOINING MATERIALS

Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver).

VALVES

Diaphragm Packless Valves: 500 psig (3450 kPa) working pressure and 275 deg F (135 deg C) working temperature, globe or angle pattern, forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, with solder-end connections.

Check Valves--Smaller than 1" NPS (DN25): 500 psig (3450 kPa) operating pressure, 300 deg F (149 deg C) operating temperature; cast-brass body, with removable piston, PTFE seat, and

stainless-steel spring; straight-through globe design. Valve shall be straight-through pattern, with solder-end connections.

Service Valves: 500 psig (3450 kPa) pressure rating, forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, with solder-end connections.

Solenoid Valves: Conform to ARI 760; 250 deg F (121 deg C) temperature rating, 400 psig (2760 kPa) working pressure; forged brass, with PTFE valve seat, 2-way straight-through pattern, and solder-end connections; manual operator; with NEMA 250, Type 1 solenoid enclosure with ½ inch (13 mm) conduit adapter, and 24-V normally closed holding coil.

Pressure-Regulating Valves: Conform to ARI 770; direct acting, brass with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connections.

Pressure Relief Valves: Straight or angle brass body and disc, neoprene seat, factory sealed and ASME labeled, for standard pressure setting.

Thermal Expansion Valves: Conform to ARI 750; thermostatic-adjustable, modulating type; size as required and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

REFRIGERANT PIPING SPECIALTIES

Straight- or Angle-Type Strainers: 430 psig (2960 kPa) working pressure; forged-brass or steel body with stainless-steel wire or brass-reinforced Monel screen, and screwed cleanout plug, with solder-end connections.

Straight, Non-Cleanable-Type Strainers: 500 psig (3450 kPa) working pressure; steel shell with stainless-steel screen, with solder-end connections.
Moisture/Liquid Indicators: 500 psig (3450 kPa) operating pressure, 200 deg F (93 deg C) operating temperature; forged-brass body, with replaceable, polished, optical viewing window with color-coded moisture indicator, and solder-end connections.

Permanent Filter-Dryer: 350 psig (2140 kPa) maximum operating pressure, 225 deg F (107 deg C) maximum operating temperature; steel shell, and wrought-copper fittings for solder-end connections; molded-felt core surrounded by desiccant.

REFRIGERANT

ASHRAE 34, R-32.

ASHRAE 34, R-454b.

PART 3 EXECUTION

EXAMINATION

Examine roughing-in for compliance with requirements for installation tolerances and other conditions affecting performance of refrigerant piping. Do not proceed with installation until unsatisfactory conditions have been corrected.

APPLICATIONS

Aboveground, within Building: Type ACR drawn-copper tubing.

INSTALLATION

Install refrigerant piping according to ASHRAE 15.

Basic piping installation requirements are specified in Division 23 Section "Basic Mechanical Materials and Methods."

Install piping in short and direct arrangement, with minimum number of joints, elbows, and fittings.

Arrange piping to allow normal inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

Install piping with adequate clearance between pipe and adjacent walls and hangers, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

Insulate suction lines and liquid lines, but insulate them together if adjacent.

A. Do not install insulation until system testing has been completed and all leaks have been eliminated.

Install branch lines to parallel compressors of equal length, and pipe identically and symmetrically.

Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

Slope refrigerant piping as follows:

A. Install horizontal hot-gas discharge piping with a uniform slope of 0.4 percent downward away from compressor.
B. Install horizontal suction lines with a uniform slope of 0.4 percent downward to compressor.
C. Install traps and double risers where indicated and where required to entrain oil in vertical runs.
D. Liquid lines may be installed level.

Use fittings for changes in direction and branch connections.

Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

Reduce pipe sizes using eccentric reducer fittings installed with level side down.

Provide bypass around moisture-liquid indicators in lines larger than 2" NPS (DN50).

Install unions to allow removal of solenoid valves, pressure-regulating valves, expansion valves, and at connections to compressors and evaporators.

Install flexible connectors at the inlet and dishcharge connection, at right angles to axial movement of compressor, parallel to crankshaft.

Install replaceable-core filter-dryers, with isolation valves and valved bypass.

Install refrigerant valves according to manufacturer's written instructions.

When brazing, remove solenoid-valve coils; remove sight glasses; and remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties. Do not apply heat near bulb of expansion valve.

Electrical wiring for solenoid valves is specified in Division 26 Sections. Coordinate electrical requirements and connections.

Mount thermostatic expansion valves in any position, close to evaporator.

A. Where refrigerant distributors are used, mount directly on expansion-valve outlet.
B. Install valve so diaphragm case is warmer than bulb.

Verify proper location for bulb with valve manufacturer.

Secure bulb to clean, straight, horizontal section of suction line using 2 bulb straps. Do not mount bulb in a trap or at the bottom of the line.

Where external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

Install pressure relief valves as required by ASHRAE 15. Pipe pressure relief valves on receivers to outdoors.

Charge and purge systems, after testing, and dispose of refrigerant following ASHRAE 15 procedures.

Charge system as follows:

A. Install filter-dryer core after leak test, but before evacuation.
B. Evacuate refrigerant system with vacuum pump, until temperature of 35 deg F (1.7 deg C) is indicated on vacuum dehydration indicator.
C. Maintain vacuum for a minimum of 5 hours.
D. Break vacuum with refrigerant gas and charge to 2 psig (14 kPa).

HANGERS AND SUPPORTS

General: Hangers, supports, and anchors are specified in Division 23 Section "Hangers and Supports." Provide according to ASME B31.5 and MSS SP-69.

Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) in length.

Tube sizes are nominal or standard tube sizes as expressed in ASTM B 88 (ASTM B 88M).

Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

Install hangers for copper tubing, steel, and ductile iron with the following maximum spacing:

A. 1-1/2" NPS (DN40) and Smaller: Maximum horizontal spacing, 60 inches (1500 mm); maximum vertical spacing, 10 feet (3 m).

Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

PIPE JOINT CONSTRUCTION

Basic pipe and tube joint construction is specified in Division 23 Section "Basic Mechanical Materials and Methods."

Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent formation of scale.

VALVE INSTALLATIONS

Install refrigerant valves according to manufacturer's written instructions.

Install valves on suction and discharge of compressor, for gage taps at compressor inlet and outlet, for gage taps at hot-gas bypass regulators, on inlet and outlet, and on each side of strainers.

Install check valves on compressor discharge and on condenser liquid lines on multiple condenser systems.

Install refrigerant-charging (packed-angle) valve in liquid line between receiver shutoff valve and expansion valve.

Install globe valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.

Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

A. Electrical wiring for solenoid valves is specified in Division 26 Sections. Coordinate electrical requirements and connections.

Mount thermostatic expansion valves in any position, close to evaporator.

A. Where refrigerant distributors are used, mount directly on expansion-valve outlet.
B. Install valve so diaphragm case is warmer than bulb.
C. Secure bulb to clean, straight, horizontal section of suction line using 2 bulb straps. Do not mount bulb in a trap or at the bottom of the line.
D. Where external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

Install pressure-regulating and relief valves as required by ASHRAE 15.

SPECIALTIES APPLICATION AND INSTALLATION

Install liquid indicators in liquid line leaving condenser, in liquid line leaving receiver, and on leaving side of liquid solenoid valves.

Install strainers immediately upstream of each automatic valve, including expansion valves, solenoid valves, hot-gas bypass valves, and compressor suction valves.

Install strainers on main liquid line where multiple expansion valves with integral strainers are used.

Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.

Install permanent filter-dryers in low-temperature systems, in systems using hermetic compressors, and before each solenoid valve.

Install solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control, in liquid line of single or multiple evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into suction line when system shuts down.

CONNECTIONS

Electrical: Conform to applicable requirements of Division 26 Sections for electrical connections.

FIELD QUALITY CONTROL

Inspect and test refrigerant piping according to ASME B31.5, Chapter VI.

A. Pressure test with nitrogen to 200 psig (1380 kPa). Perform final tests at 27-psig (186-kPa) vacuum and 200 psig (1380 kPa) using halide torch or electronic leak detector. Test to no leakage.

Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

Repair leaks using new materials; retest.

ADJUSTING

Adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

CLEANING

Before installation of copper tubing other than Type ACR, clean tubing and fittings with trichloroethylene.

COMMISSIONING

Charge system using the following procedures:

A. Evacuate refrigerant system with vacuum pump until temperature of 35 deg F (1.67 deg C) is indicated on vacuum dehydration indicator.
B. During evacuation, apply heat to pockets, elbows, and low spots in piping.
C. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
D. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
E. Complete charging of system, using new filter-dryer core in charging line. Provide full-operating charge.
F. Complete charging of system, using new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

23 31 13 METAL DUCTS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg (minus 500 to plus 2490 Pa).

Related Sections include the following:

A. Division 7 Section "Joint Sealants" for fire-resistant sealants for use around duct penetrations and fire-damper installations in fire-rated floors, partitions, and walls.
B. Division 8 Section "Access Doors" for wall- and ceiling-mounted access doors for access to concealed ducts.
C. Division 23 Section "Mechanical Insulation" for duct insulation.
D. Division 23 Section "Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
E. Division 23 Section "Diffusers, Registers, and Grilles."
F. Division 23 Section "Testing, Adjusting, and Balancing" for air balancing and final adjusting of manual-volume dampers.

DEFINITIONS:

Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula Btu x in./h x sq. ft. x deg F or W/m x K at the temperature differences specified. Values are expressed as Btu or W.

A. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.

SYSTEM DESCRIPTION:

Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Not all fittings and offsets are indicated on the plans and it is assumed that the Contractor is to include these to accommodate minor changes required for coordination and installation of duct system. Significant changes to layout or configuration of duct system must be specifically approved in writing by Engineer/Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

SUBMITTALS:

Product Data: For duct liner and sealing materials.

Shop Drawings: Show details of the following:

A. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.

B. Duct layout indicating pressure classifications and sizes on plans.
C. Fittings.
D. Reinforcement and spacing.
E. Seam and joint construction.
F. Penetrations through fire-rated and other partitions.
G. Terminal unit, coil, and humidifier installations.
H. Hangers and supports, including methods for building attachment, vibration isolation, seismic restraints, and duct attachment.

Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

QUALITY ASSURANCE:

Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.

Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

DELIVERY, STORAGE, AND HANDLING:

Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

Store and handle sealant and firestopping materials according to manufacturer's written recommendations.

Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

PART 2 PRODUCTS

SHEET METAL MATERIALS:

Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

DUCT LINER:

General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."

Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.

A. Thickness: 1 inch (25 mm) on all supply and return ductwork.
B. Thermal Conductivity (k-Value): 0.26 at 75 deg F (0.037 at 24 deg C) mean

temperature.

C. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
D. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
E. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
   1. Tensile Strength: Indefinitely sustain a 50-lb- (23-kg-) tensile, dead-load test perpendicular to duct wall.
   2. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
   3. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Certainteed (ToughGard R)
   2. Manson (Akousti-Liner)
   3. Manville (Line Acoustic)

SEALANT MATERIALS:

Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

A. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber fabric reinforced.
B. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
C. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
D. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

HANGERS AND SUPPORTS:

Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.

A. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
   1. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.

A. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
B. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

A. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

RECTANGULAR DUCT FABRICATION:

General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

A. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
B. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:

A. Supply Ducts: 3-inch wg (750 Pa).
B. Return Ducts: 2-inch wg (500 Pa), negative pressure.
C. Exhaust Ducts: 2-inch wg (500 Pa), negative pressure.

Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. ft. (0.93 sq. m) of unbraced panel area, unless ducts are lined.

SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS:

Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.

Apply adhesive to liner facing in direction of airflow not receiving metal nosing.

Butt transverse joints without gaps and coat joint with adhesive.

Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s). Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely around perimeter; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.

Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:

A. Fan discharge.
B. Intervals of lined duct preceding unlined duct.
C. Upstream edges of transverse joints in ducts.

Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.

ROUND DUCT FABRICATION:

General: Diameter as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to perimeter of a given size of flat-oval duct.

Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

ROUND SUPPLY AND EXHAUST FITTING FABRICATION:

90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

A. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
B. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg (minus 500 to plus 500 Pa):
   1. Ducts 3 to 26 Inches (75 to 660 mm) in Diameter: 0.028 inch (0.7 mm).
   2. Ducts 27 to 36 Inches (685 to 915 mm) in Diameter: 0.034 inch (0.85 mm).

C. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg (500 to 2490 Pa):
   1. Ducts 3 to 14 Inches (75 to 355 mm) in Diameter: 0.028 inch (0.7 mm).
   2. Ducts 15 to 26 Inches (380 to 660 mm) in Diameter: 0.034 inch (0.85 mm).
   3. Ducts 27 to 50 Inches (685 to 1270 mm) in Diameter: 0.040 inch (1.0 mm).

B. 90-Degree, Two-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material-handling classes A and B; and only where space restrictions do not permit using 1.5 bend radius elbows. Fabricate with single-thickness turning vanes.
C. Round Elbows, 8 Inches (200 mm) and Smaller: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
D. Round Elbows, 9 through 14 Inches (225 through 355 mm): Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees, unless space restrictions require a mitered elbow. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
E. Round Elbows, Larger Than 14 Inches (355 mm), and All Flat-Oval Elbows: Fabricate gored elbows, unless space restrictions require a mitered elbow.
F. Die-Formed Elbows for Sizes through 8 Inches (200 mm) and All Pressures: 0.040 inch

(1.0 mm) thick with two-piece welded construction.

G. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
H. Pleated Elbows for Sizes through 14 Inches (355 mm) and Pressures through 10-Inch wg (2490 Pa): 0.022 inch (0.55 mm).

PART 3 EXECUTION

DUCT INSTALLATION, GENERAL:

Duct installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.

Construct and install each duct system for the specific duct pressure classification indicated.

Install round ducts in lengths not less than 12 feet (3.7 m), unless interrupted by fittings.

Install ducts with fewest possible joints.

Install fabricated fittings for changes in directions, changes in size and shape, and connections.

Install couplings tight to duct wall surface with a minimum of projections into duct.

Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches (38 mm).

Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

INSULATION:

Provide duct liner on all rectangular supply and return ductwork. All dimensions of ductwork shown on the plans are the required clear interior dimensions unless noted otherwise.

Reference Section 23 07 13 for other duct insulation requirements.

SEAM AND JOINT SEALING:

General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Pressure Classification Less Than 2-Inch wg (500 Pa): Transverse joints.

Seal externally insulated ducts before insulation installation.

HANGING AND SUPPORTING:

Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

Support vertical ducts at a maximum interval of 16 feet (5 m) and at each floor.

Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

CONNECTIONS:

Connect equipment with flexible connectors according to Division 23 Section "Duct Accessories."

For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

ADJUSTING:

Adjust volume-control dampers in ducts, outlets, and inlets to achieve design airflow.

Refer to Division 23 Section "Testing, Adjusting, and Balancing" for detailed procedures.

CLEANING:

After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

END OF SECTION

23 33 00 DUCT ACCESSORIES

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes the following:

A. Manual-volume dampers.
B. Fire and smoke dampers.
C. Turning vanes.
D. Duct-mounted access doors and panels.
E. Flexible ducts.
F. Flexible connectors.
G. Duct accessory hardware.

Related Sections include the following:
A. Division 23 Section "Air Terminals" for constant-volume and variable-air-volume control boxes, and reheat boxes.
B. Division 23 Section "Diffusers, Registers, and Grilles."
C. Division 28 Section "Fire Alarm Systems" for duct-mounted fire and smoke detectors.

SUBMITTALS:

Product Data: For the following:

A. Manual-volume dampers.
B. Fire and smoke dampers.
C. Duct-mounted access doors and panels.
D. Flexible ducts.

Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:

A. Special fittings and manual- and automatic-volume-damper installations.
B. Fire- and smoke-damper installations, including sleeves and duct-mounted access doors and panels.

Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

QUALITY ASSURANCE:

NFPA Compliance: Comply with the following NFPA standards:

A. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
B. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

EXTRA MATERIALS:

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

A. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 PRODUCTS

SHEET METAL MATERIALS:

Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

Low Pressure Supply Ductwork: to have a 2-inch static pressure classification (i.e., after FPVAV's, SAV's and on low pressure AHU's). Medium pressure supply ductwork to have a 4-inch static pressure classification (i.e., VAV systems).

MANUAL-VOLUME DAMPERS:

General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

A. Pressure Classifications of 3-Inch wg (750 Pa) or Higher: End oilite bearings for ducts with 3/8" axles full length of damper blades and bearings at both ends of operating shaft. Extended quadrant locks with 3/8" dial regulators and end extended bearing plates for externally insulated ductwork. Rectangular ducts 20" and wider same as above with 16 Ga. blades, ½" axles and dial regulators. (Equal to Ruskin MD25/MDRS25)

Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, and suitable for horizontal or vertical applications.

A. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch (1.62 mm) thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
B. Roll-Formed Steel Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.
C. Blade Axles: Galvanized steel.
D. Tie Bars and Brackets: Galvanized steel.

Jackshaft: 1-inch- (25-mm-) diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

A. Length and Number of Mountings: Appropriate to connect linkage of each damper of a multiple-damper assembly.

Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

FIRE DAMPERS:

General: Labeled to UL 555, static (fan off), Class I.

Fire Rating: One and one-half and three hours.

Frame: SMACNA Type B with blades *out of airstream*; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.

A. Minimum Thickness: 0.052 inch (1.3 mm) or 0.138 inch (3.5 mm) thick as indicated, and length to suit application.
B. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

Mounting Orientation: Vertical or horizontal as indicated.

Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized steel blade connectors.

Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.

Fusible Link: Replaceable, 165 or 212 deg F (74 or 100 deg C) rated as indicated.

CEILING FIRE DAMPERS:

General: Labeled to UL 555C; comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

Frame: 0.040-inch- (1.0-mm-) thick, galvanized, sheet steel; round or rectangular; style to suit ceiling construction.

Blades: 0.034-inch- (0.85-mm-) thick, galvanized, sheet steel with nonasbestos refractory insulation.

Volume Adjustment: UL-labeled, fusible volume-control adjustment.

Fusible Link: Replaceable, 165 deg F (74 deg C) rated.

COMBINATION FIRE/SMOKE DAMPERS:

General: Labeled to UL 555S. Combination fire and smoke dampers shall be labeled for one-and-one-half-hour rating to UL 555, dynamic, Class I.

Fusible Link: Replaceable, 165 or 212 deg F (74 or 100 deg C) rated as indicated.

Frame and Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.

Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel; length to suit wall or floor application.

Damper Motors: Provide for ~~modulating or~~ two-position action.

A. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
B. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).
C. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).
D. Two-Position Motor: 115 V, single phase, 60 Hz.
E. Automatic override option.
F. Resetable Link.

SMOKE DAMPERS:

General: Labeled to UL 555S. Damper to be rated to Leakage Class III with elevated temperature rating of 250°F.

Frame and Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.

Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel; length to suit wall or floor application.

Damper Motors: Provide for modulating or two-position action.

A. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
B. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).
C. Outdoor Motors and Motors in Outside-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).
D. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).
E. Two-Position Motor: 115 V, single phase, 60 Hz.
F. Automatic override option.

TURNING VANES:

Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Manufactured Turning Vanes: Fabricate of 1-1/2-inch- (38-mm-) wide, curved blades set 3/4 inch (19 mm) o.c.; support with bars perpendicular to blades set 2 inches (50 mm) o.c.; and set into side strips suitable for mounting in ducts.

DUCT-MOUNTED ACCESS DOORS AND PANELS:

General: Fabricate doors and panels airtight and suitable for duct pressure class.

Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel. Include 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.

Size: Size door to be 2-inches smaller than side of duct installed on, with a maximum size of 24- by-24-inch.

Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

Insulation: 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

FLEXIBLE CONNECTORS:

General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches (89 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.

Transverse Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches (89 mm) wide attached to two strips of 4-3/8-inch- (111-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.

Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.

A. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).

FLEXIBLE DUCTS

General: Comply with UL 181, Class 1.

Flexible Ducts, Uninsulated: Corrugated aluminum.

Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch- (38-mm-) thick, glass-fiber insulation around a continuous inner liner.

A. Reinforcement: Steel-wire helix encapsulated in inner liner.
B. Outer Jacket: Polyethylene film.
C. Inner Liner: Polyethylene film.

Pressure Rating: 6-inch wg (1500 Pa) positive, 1/2-inch wg (125 Pa) negative.

ACCESSORY HARDWARE:

Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.

Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch (6-mm), zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches (75 to 450 mm) to suit duct size.

Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 EXECUTION

INSTALLATION:

Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.

Install volume dampers in lined duct; avoid damage to and erosion of duct liner.

Manual volume dampers are to be provided in duct runouts for all diffusers, grilles, and registers. Damper to be located at the main duct take-off. Locations where grilles and registers are mounted directly on the main duct an opposed blade damper (OBD) is to be provided.

Provide test holes at fan inlet and outlet and elsewhere as indicated.

Install fire and smoke dampers according to manufacturer's UL-approved written instructions.

A. Install fusible links in fire dampers.

Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.

A. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
B. Install access panels on side of duct where adequate clearance is available.

Label access doors according to Division 23 Section "Mechanical Identification."

ADJUSTING:

Adjust duct accessories for proper settings.

Adjust fire and smoke dampers for proper action.

Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION

23 34 23 HVAC POWER VENTILATORS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes the following:

A. Centrifugal roof ventilators.

Related Sections: The following Sections contain requirements that relate to this Section:

A. Division 7 Section "Manufactured Roof Specialties" for roof curbs and equipment supports.
B. Division 26 Section "Disconnects and Circuit Breakers" for disconnect switches.
C. Division 26 Section "Motor Controllers" for motor starters.

Products furnished, but not installed, under this Section include roof curbs for roof-mounted exhaust fans.

PERFORMANCE REQUIREMENTS:

Project Altitude: Base air ratings on actual site elevations.

Operating Limits: Classify according to AMCA 99.

Fan Unit Schedule: The following information is described in an equipment schedule on the Drawings.

A. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
B. Fan arrangement including wheel configuration, inlet and discharge configurations, and required accessories.

SUBMITTALS:

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:

A. Certified fan performance curves with system operating conditions indicated.
B. Certified fan sound power ratings.
C. Motor ratings and electrical characteristics plus motor and electrical accessories.
D. Material gages and finishes, including color charts.
E. Dampers, including housings, linkages, and operators.

Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions,

weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 1 and in Division 23 Section "Basic Mechanical Requirements."

QUALITY ASSURANCE:

Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

A. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
B. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.

NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

UL Standard: Provide power ventilators that comply with UL 705.

PROJECT CONDITIONS:

Field Measurements: Verify dimensions by field measurements. Verify clearances.

Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

COORDINATION AND SCHEDULING:

Coordinate the size and location of structural steel support members.

Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 7 Sections.

EXTRA MATERIALS:

Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the

following:

A. Centrifugal Roof Ventilators:
   1. Loren Cook.
   2. Greenheck.
   3. Penn Barry.
   4. ACME.

CENTRIFUGAL ROOF VENTILATORS:

Description: Belt-driven or direct-drive centrifugal fans, as indicated, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

A. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

Housing: Removable, extruded-aluminum, rectangular top; square, one-piece, aluminum base with venturi inlet cone.

Housing: Removable, galvanized steel, mushroom-domed top; square, one-piece, hinged, aluminum base with venturi inlet cone.

Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:

A. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
B. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
C. Pulleys: Cast-iron, adjustable-pitch motor pulley.
D. Fan and motor isolated from exhaust air stream.

Accessories: The following items are required as indicated:

A. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent.
B. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
C. Bird Screens: Removable 1/2-inch (13-mm) mesh, aluminum or brass wire.
D. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
E. Roof Curbs: Galvanized steel; mitered and welded corners; 2-inch- (50-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 2-inch (50-mm) wood nailer. Size as required to suit roof opening and fan base. Secure curb to roof and unit to curb per ASCE 7-05 requirements
   1. Configuration: Built-in cant and mounting flange.
   2. Overall Height: 18 inches (450 mm).

MOTORS:

Refer to Division 23 Section "Motors" for general requirements for factory-installed motors.

Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.
Enclosure Type: The following features are required as indicated:

A. Open dripproof motors where satisfactorily housed or remotely located during operation.
B. Guarded dripproof motors where exposed to contact by employees or building occupants.

FACTORY FINISHES:

Sheet Metal Parts: Prime coat before final assembly.

Exterior Surfaces: Baked-enamel finish coat after assembly.

Aluminum Parts: No finish required.

SOURCE QUALITY CONTROL:

Testing Requirements: The following factory tests are required as indicated:

A. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA Seal.
B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 EXECUTION

EXAMINATION:

Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION:

Install power ventilators according to manufacturer's written instructions.

Support units using the vibration-control devices indicated. Vibration-control devices are specified in Division 23 Section "Vibration Control."

A. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.
   1. Installation of roof curbs is specified in Division 7 Sections.

B. Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.
C. Ceiling Units: Suspend units from structure using steel wire or metal straps.

Install units with clearances for service and maintenance.

Label units according to requirements specified in Division 23 Section "Mechanical Identification."

CONNECTIONS:

Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

Electrical: Conform to applicable requirements in Division 26 Sections.

Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

FIELD QUALITY CONTROL:

Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

ADJUSTING:

Adjust damper linkages for proper damper operation.

Adjust belt tension.

Lubricate bearings.

CLEANING:

After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

Clean fan interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

COMMISSIONING:

Final Checks before Startup: Perform the following operations and checks before startup:

A. Verify that shipping, blocking, and bracing are removed.
B. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.
C. Perform cleaning and adjusting specified in this Section.
D. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
E. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
F. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.
G. Disable automatic temperature-control operators.

Starting procedures for fans are as follows:

A. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
B. Measure and record motor voltage and amperage.

Shut unit down and reconnect automatic temperature-control operators.

Refer to Division 23 Section "Testing, Adjusting, and Balancing" for procedures for air-handling-system testing, adjusting, and balancing.

Replace fan and motor pulleys as required to achieve design conditions.

DEMONSTRATION:

Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout."

Schedule training with Owner, through Architect, with at least 7 days' advance notice.

Demonstrate operation of power ventilators. Conduct walking tour of the Project. Briefly identify location and describe function, operation, and maintenance of each power ventilator.

END OF SECTION

23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

Related Sections include the following:

A. Division 23 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
B. Division 23 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

DEFINITIONS:

Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

Register: A combination grille and damper assembly over an air opening.

SUBMITTALS:

Product Data: For each model indicated, include the following:

A. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
B. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
C. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
D. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods.

QUALITY ASSURANCE:

Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 PRODUCTS

MANUFACTURERS:

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

MANUFACTURED UNITS:

Diffusers, registers, and grilles are scheduled on Drawings.

SOURCE QUALITY CONTROL:

Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 EXECUTION

EXAMINATION:

Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION:

Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

ADJUSTING:

After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

CLEANING:

After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

23 40 00 AIR FILTERS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes factory-fabricated air-filter devices and media used to remove particulate matter from air for HVAC applications.

SUBMITTALS:

Product Data: Include dimensions; shipping, installed, and operating weights; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

Shop Drawings: Include plans, elevations, sections, and details to illustrate component assemblies and attachments.

A. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
B. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.

Maintenance Data: For each type of filter and rack to include in maintenance manuals specified in Division 1.

QUALITY ASSURANCE:

Product Options: Drawings indicate size, profiles, and dimensional requirements of air filters and are based on the specific system indicated.

Comply with NFPA 90A and NFPA 90B.

ASHRAE Compliance: Comply with provisions of ASHRAE 52.1 for method of testing and rating air-filter units.

Comply with ARI 850.

COORDINATION:

Coordinate size and location of filters to match ductwork and equipment.

EXTRA MATERIALS:

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

A. Provide one complete set of filters for each filter bank to change prior to air balancing. Do not install final filters into system until just prior to balancing.
B. Provide one complete set of filters for each filter bank at project completion, both prefilters and final filters

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Air Filters and Filter-Holding Systems:
   1. AAF International.
   2. Farr Co.

EXTENDED-SURFACE, DISPOSABLE PANEL PRE-FILTERS: (AHU's)

Description: 2" factory-fabricated, medium efficiency, disposable, dry, extended-surface filters with holding frames.

Media: Non-woven, reinforced cotton and synthetic fabric with a minimum thickness of 0.15" and a unit weight of 2.5 ounces per square yard, formed into deep-V-shaped pleats and held by self-supporting wire grid with a 96% open area.

Media is to be U.L. Class 2, and rated on ASHRAE Test Standard 52.1-92 at 25-30% efficiency.

Media Support Grid and Frame: Welded wire on 1" centers, bonded to the media. Frame to be a rigid, high wet strength cardboard with diagonal support members bonded to the entering and exiting side of each pleat. Frame shall be chemically bonded to the filter.

SIDE-SERVICE HOUSINGS:

Description: Factory-assembled, side-service housings, constructed of galvanized steel, with flanges to connect to duct system. Framing should accommodate a 2-inch (50-mm) disposable filter.

Access Doors: Continuous gaskets on perimeter and positive-locking devices. Arrange so filter cartridges can be loaded from either access door.

Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.

PART 3 EXECUTION

INSTALLATION:

Install filter frames according to manufacturer's written instructions.

Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.

Install filters in position to prevent passage of unfiltered air.

Install filter gage for each filter bank.

Install filter gage static-pressure tips upstream and downstream from filters to measure pressure drop through filter. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.

Coordinate filter installations with duct and air-handling unit installations.

CLEANING:

After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION

23 81 19 ROOFTOP UNITS

PART 1 GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

SUMMARY:

This Section includes rooftop heating and cooling units.

Related Sections include the following:

A. Division 7 Section "Manufactured Roof Specialties" for type and style of roof curbs and equipment supports.
B. Division 23 Section "Mechanical Vibration Controls and Seismic Restraints" for manufactured isolation bases.
C. Division 23 Section "Control Systems Equipment" for temperature-control devices, and control wiring and control devices connected to energy recovery units.

SUBMITTALS:

Product Data: Include manufacturer's technical data for each model indicated, including rated capacities of selected model clearly indicated; dimensions; required clearances; shipping, installed, and operating weights; furnished specialties; accessories; and installation and startup instructions.

Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.

A. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

Commissioning Reports: Indicate results of startup and testing commissioning requirements. Submit copies of checklists.

Maintenance Data: For equipment to include in the maintenance manuals specified in Division 1.

Warranties: Special warranties specified in this Section.

QUALITY ASSURANCE:

Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy

Efficient Design of New Buildings except Low-Rise Residential Buildings."

Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.

A. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
B. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

Comply with AGA Z223.1 for gas-fired furnace section.

Comply with NFPA 70.

DELIVERY, STORAGE, AND HANDLING:

Deliver rooftop units as factory-assembled units with protective crating and covering.

Coordinate delivery of units in sufficient time to allow movement into building.

Handle rooftop units to comply with manufacturer's written rigging and installation instructions for unloading and moving to final location.

COORDINATION:

Coordinate installation of roof curbs, equipment supports, and roof penetrations with roof construction. Roof specialties are specified in Division 7 Sections.

WARRANTY:

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

Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

A. Warranty Period, Compressors: Manufacturers standard, but not less than 5 years after date of Substantial Completion.
B. Warranty Period, Heat Exchangers: Manufacturers standard, but not less than 10 years after date of Substantial Completion.

EXTRA MATERIALS:

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

A. Fan Belts: One set for each belt-drive fan.
B. Filters: Two ~~One~~ sets of filters for each unit.

PART 2 PRODUCTS

MANUFACTURERS:

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

A. Rooftop Units:
   1. Carrier.
   2. Lennox.
   3. Daikin.
   4. Trane.
   5. York.
   6. AAON.

ROOFTOP UNITS, 7-1/2 TO 20 TONS (26 TO 70 kW):

Description: Factory assembled and tested; designed for roof or slab installation; and consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers.

Casing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch- (13-mm-) thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

Evaporator Fans: Forward curved, centrifugal, belt driven with adjustable sheaves or direct-drive fans; and with permanently lubricated motor bearings.

Condenser Fans: Propeller type, directly driven with permanently lubricated motor bearings.

Refrigerant Coils: Aluminum-plate fin and seamless copper tube in galvanized steel casing with equalizing-type vertical distributor.

Compressors: Serviceable, semihermetic, or fully hermetic compressors with integral vibration isolators and crankcase heaters.

A. Safety Controls: Manual-reset type for low pressure, high pressure, and compressor motor overload protection.
B. Timed-Off Control: Automatic-reset control shuts compressor off after 5 minutes.

Heat Exchangers: Manufacturer's standard construction for gas-fired heat exchangers and burners with the following controls:

A. Redundant, dual gas valves (2-stage heating).
B. Intermittent pilot ignition.
C. Electronic-spark ignition system.
D. High-limit cutout.
E. Forced-draft proving switch.

Economizer Control: Return- and outside-air dampers, outside-air filter, fully modulating electronic-control system with adjustable mixed-air thermostat and automatic changeover through adjustable enthalpy-control device.

Variable-Air-Volume Control: Electric discharge-air-temperature step controller and electronic-control system.

Low Ambient Control: Head-pressure control, designed to operate at temperatures as low as 30 deg F (minus 1 deg C).

Thermostat: Programmable, electronic; with heating setback and cooling setup with 7-day programming.

Smoke Detectors: Photoelectric detector located in return-air plenum, to de-energize unit.

Operating Controls: Factory-installed microprocessor controls and monitors unit and communicates with central control processor.

A. Control Outputs: 2-stage heating, 2-stage cooling; and automatic or continuous fan operation and economizer damper operation.
B. Control Sensors: Return-air-temperature sensor, fan airflow-proving switch, dirty-filter switch, discharge-air-temperature sensor, room-temperature sensor, and night-setback-override switch.
C. Control Features: Day/occupied modes for high or low enthalpy and night/unoccupied mode.

ROOF CURBS:

Manufacturer's standard, insulated with corrosion-protection coating, gasketing, factory-installed wood nailer, according to NRCA standards, and meeting ASCE 7-05 requirements.

A. Curb Height: Minimum 16 inches (400 mm).
B. Means of attachment of the unit to the curb and the curb to the roof structure are to be provided by the unit manufacturer per ASCE 7-05 and the Building Code wind load requirements. Provide as a minimum 12 gage galvanized sheet metal 'Z' straps or brackets with #10 stainless steel screws with a minimum of four screws in strap, two in curb, two in unit. Straps are to be located on 48" centers with a minimum of two per each side and one on each end. Curbs are to be welded to the roof structure and deck.

MOTORS:

Refer to Division 23 Section "Motors" for general requirements for factory-installed motors.

Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

Enclosure Type: Open, dripproof.

SOURCE QUALITY CONTROL:

Verification of Performance: Rate capacity according to ARI 360, "Commercial and Industrial Unitary Air-Conditioning Equipment."

A. Sound Power Level Ratings: Comply with ARI 270, "Standard for Sound Rating of Outdoor Unitary Equipment."

PART 3 EXECUTION

EXAMINATION:

Examine roof for compliance with requirements for conditions affecting installation and performance of rooftop units. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION:

Install units according to manufacturer's written instructions.

Install units level and plumb, maintaining manufacturer's recommended clearances.

Curb Support: Install roof curb on roof structure, level, according to NRCA's written installation instructions. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing with roof construction.

Unit Support: Install unit on structural curbs and level. Coordinate wall penetrations and flashing with wall construction.

CONNECTIONS:

Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

A. Install piping to allow service and maintenance.
B. Gas Piping: Conform to applicable requirements of Division 15 Section "Natural Gas Piping." Connect gas piping to burner, full size of gas train inlet, and provide union with sufficient clearance for burner removal and service.

Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

A. Install ducts to termination in roof mounting frames. Where indicated, terminate return-air duct through roof structure and insulate space between roof and bottom of unit.

Electrical: Conform to applicable requirements in Division 26 Sections.

Ground equipment.

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

COMMISSIONING:

Verify that installation is as indicated and specified.

Complete manufacturer's installation and startup checks and perform the following:

A. Level unit on housekeeping base, and flash curbs to unit and to roof.
B. Inspect for visible damage to unit casing.
C. Inspect for visible damage to furnace combustion chamber.
D. Inspect for visible damage to compressor, air-cooled condenser coil, and fans.

E. Verify that clearances have been provided for servicing.
F. Check that labels are clearly visible.
G. Clean furnace flue and condenser and inspect for construction debris.
H. Verify that controls are connected and operable.
I. Remove shipping bolts, blocks, and tie-down straps.
J. Verify that filters are installed.
K. Adjust vibration isolators.
L. Connect and purge gas line.
M. Check that burner and controls are suitable to operate at temperatures as low as minus 40 deg F (minus 40 deg C).
N. Check acoustic insulation.
O. Check operation of barometric dampers.

Lubricate bearings on fan.

Check fan-wheel rotation for correct direction without vibration and binding.

Adjust fan belts to proper alignment and tension.

Start unit according to manufacturer's written instructions.

A. Perform starting of refrigeration in summer only.
B. Complete startup sheets and attach copy with Contractor's startup report.

Check and record performance of interlocks and protection devices; verify sequences.

Operate unit for an initial period as recommended or required by manufacturer.

Perform the following operations for both minimum and maximum firing, and adjust burner for peak efficiency. Adjust pilot to stable flame.

A. Measure gas pressure on manifold.
B. Measure combustion-air temperature at inlet to combustion chamber.
C. Measure flue-gas temperature at furnace discharge.
D. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
E. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
F. Check for backdraft under full operation.

Calibrate thermostats.

Adjust and check high-temperature limits.

Check internal isolators.

Check outside-air damper for proper stroke and interlock with return-air dampers.

Check controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.

Start refrigeration and measure and record the following:

A. Coil leaving-air, dry- and wet-bulb temperatures.

B. Coil entering-air, dry- and wet-bulb temperatures.
C. Outside-air, dry-bulb temperature.
D. Air-cooled-condenser, discharge-air, dry-bulb temperature.

Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

A. Supply-air volume.
B. Return-air volume.
C. Relief-air volume.
D. Outside-air intake volume.

Simulate maximum cooling demand and check the following:

A. Compressor refrigerant suction and hot-gas pressures.
B. Short circuiting air through condenser or from condenser to outside-air intake.

Verify operation of remote panel, including pilot-light operation and failure modes. Check the following:

A. High-limit heat exchanger.
B. Warm-up for morning cycle.
C. Freezestat operation.
D. Free-cooling mode, outside-air changeover.
E. Alarms.

After starting and performance testing, change filters, vacuum heat exchanger and cooling and condenser coils, lubricate bearings, adjust belt tension, and check operation of power vents.

DEMONSTRATION:

Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

A. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
B. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."
C. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
D. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

END OF SECTION

23 81 26 SPLIT-SYSTEM AIR-CONDITIONER

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

Related Sections include the following:

DEFINITIONS

Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling (heat rejection for heating operation in heat pump units) and a fan to circulate air to conditioned space.

Compressor-Condenser Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant (evaporator for heating operation in heat pump units).

SUBMITTALS

Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

Maintenance Data: For split-system air-conditioning units to include in maintenance manuals specified in Division 1.

Warranties: Special warranties specified in this Section.

QUALITY ASSURANCE

Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered.

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

COORDINATION

Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7 Section "Roof Accessories."

WARRANTY

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

EXTRA MATERIALS

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

A. Filters: One set of filters for each unit.
B. Fan Belts: One set of belts for each unit.

PART 2 PRODUCTS

MANUFACTURERS

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

A. LG.
B. Carrier.
B. EMI.
C. Mitsubishi.
E. Sanyo.
F. Trane.
G. York.

WALL- OR CEILING-MOUNTED, EVAPORATOR-FAN COMPONENTS

Cabinet: Enameled steel with removable panels on front and ends, and discharge drain pans with drain connection.

Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

Fan and Motor: Centrifugal fan, directly driven by multispeed, electric motor with integral overload protection; resiliently mounted.

Filters: Throwaway.

AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.

Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid sub-cooler.

Fan: Aluminum-propeller type, directly connected to motor.

Motor: Permanently lubricated, with integral thermal-overload protection.

Low Ambient Kit: Permits operation down to 0 deg F.

Mounting Base: Polyethylene.

ACCESSORIES

Thermostat: Low voltage with subbase to control compressor and evaporator fan.

Automatic-reset timer to prevent rapid cycling of compressor.

Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

PART 3 EXECUTION

INSTALLATION

Install units level and plumb.

Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

Install roof-mounted compressor-condenser components on equipment supports specified in Division 7 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

Connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

CONNECTIONS

Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

Install piping adjacent to unit to allow service and maintenance.

Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.

Ground equipment.

Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

FIELD QUALITY CONTROL

Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

COMMISSIONING

Engage a factory-authorized service representative to perform startup service.

Verify that units are installed and connected according to the Contract Documents.

Lubricate bearings, adjust belt tension, and change filters.

Perform startup checks according to manufacturer's written instructions and do the following:

A. Fill out manufacturer's checklists.
B. Check for unobstructed airflow over coils.
C. Check operation of condenser capacity-control device.
D. Verify that vibration isolation devices and flexible connectors dampen vibration transmission to structure.

DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

A. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.
C. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."

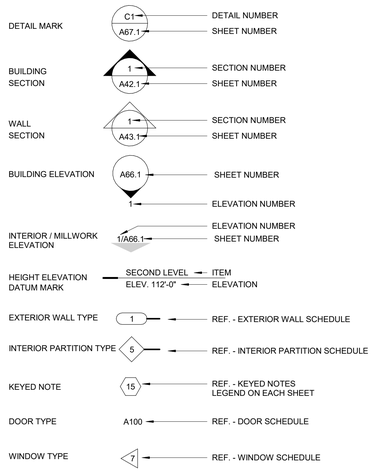
D. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
E. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION

SEDGWICK COUNTY ELECTIONS AND RECORDS MANAGEMENT REMODEL

ADDENDUM 1 - 11.03.2025

GRAPHIC SYMBOLS



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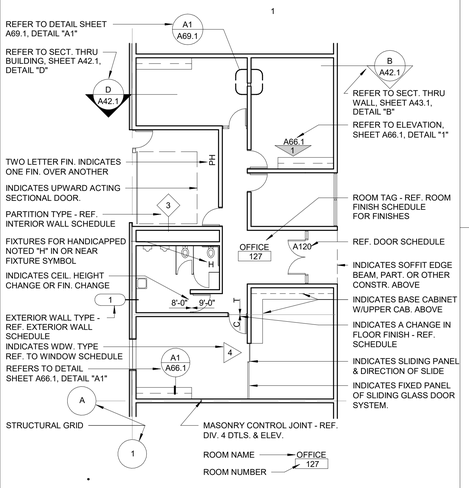
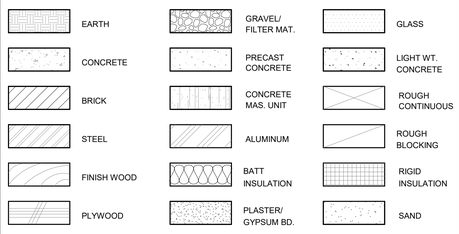


GRAPHIC SYMBOLS HATCH



DESIGN TEAM

ARCHITECT

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CONTACT: BRAD WARD, PE
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ELECTRICAL ENGINEER

INTEGRATED CONSULTING ENGINEERING
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WICHITA, KS 67211
316.264.3588

CONTACT: GARY STEFAN
gstefan@icoengineers.net

CLIENT INFORMATION

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WICHITA, KS 67203

PROJECT MANAGER:
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SEDGWICK CO. FACILITIES DIRECTOR
271 W. 3RD ST., SUITE 325
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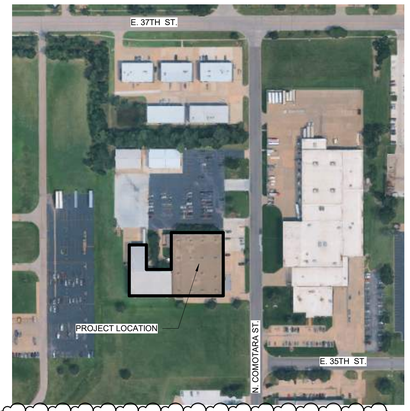
andrew.dilts@sedgwick.gov
316.660.9080

PROJECT DESCRIPTION



REMODEL OF EXISTING OFFICE SPACE AND WAREHOUSE. 1

SHEET INDEX

1

BIDDING QUESTIONS

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schaefer architecture

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MIDWEST ENGINEERING, INC.
INTEGRATED CONSULTING ENGINEERS, P.A.

SEDGWICK COUNTY
ELECTIONS AND RECORDS MANAGEMENT REMODEL
3639 N. Comotara St., Wichita, KS 67226

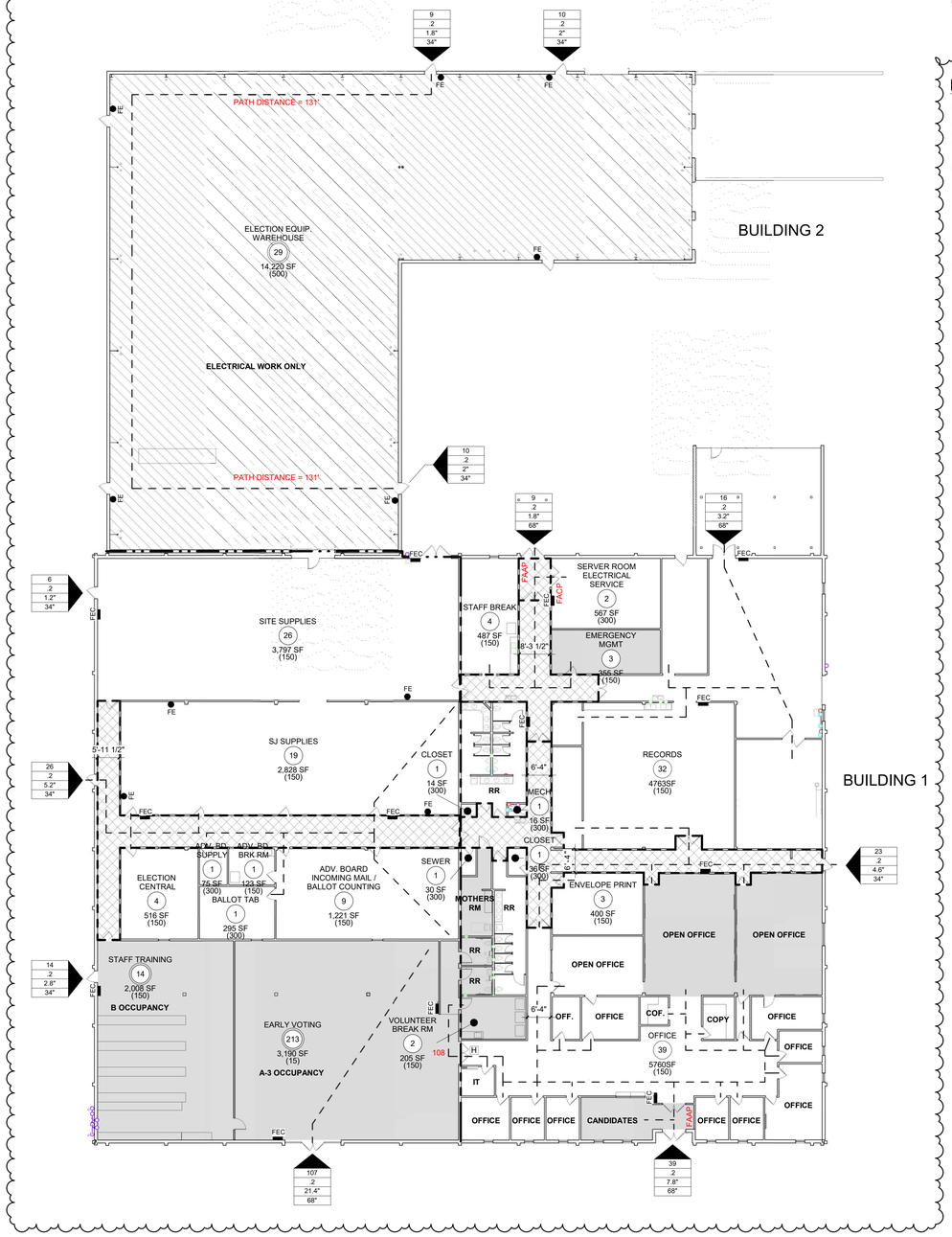
REVISIONS
1 AD 1 11.03.2025

PROJECT NUMBER
5278.57

DATE
10.16.25

COVER & GENERAL INFORMATION

G10.1



A CODE PLAN
1/16" = 1'-0"

BUILDING 1 - TYPE 5B, 1 STORY, B OCC.

EXISTING NON-COMPLIANT BUILDING

OCCUPANCY:	GROUP B	ACTUAL BLDG. SF: 31,945 S.F.
CONSTRUCTION TYPE:	V-B	ACTUAL HEIGHT: 16'
MIXED OCCUPANCY:	A-3 IS ACCESSORY	ACTUAL STORIES: 1

FIRE RESISTIVE REQUIREMEMNTS (TABLE 601)

BUILDING ELEMENT	RATING (HOURS)
STRUCTURAL FRAME	0
BEARING WALLS - EXTERIOR	0
BEARING WALLS - INTERIOR	0
NON BEARING EXTERIOR WALLS	TABLE 602
NON BEARING INTERIOR WALLS	0
FLOORS	0
ROOF	0

EXTERIOR WALL PROTECTION (TABLE 602)

<5'	1
>5', <10'	1
>10', <30'	0
>30'	0

BUILDING 2 - TYPE 2B, 1 STORY, S-2 OCC.

EXISTING BUILDING

OCCUPANCY:	GROUP S-2	ACTUAL BLDG. SF: 14,220 S.F.
CONSTRUCTION TYPE:	II-B	ACTUAL HEIGHT:
MIXED OCCUPANCY:	NONE	ACTUAL STORIES: 1

FIRE RESISTIVE REQUIREMEMNTS (TABLE 601)

BUILDING ELEMENT	RATING (HOURS)
STRUCTURAL FRAME	0
BEARING WALLS - EXTERIOR	0
BEARING WALLS - INTERIOR	0
NON BEARING EXTERIOR WALLS	TABLE 602
NON BEARING INTERIOR WALLS	0
FLOORS	0
ROOF	0

EXTERIOR WALL PROTECTION (TABLE 602)

<5'	1
>5', <10'	1
>10', <30'	0
>30'	0

PROJECT INFORMATION

TYPE OF CONSTRUCTION:	RENOVATION
LOCATION:	3639 N COMOTARA, WICHITA, KS 67226
OWNER:	SEDGWICK COUNTY, 525 N. MAIN ST, WICHITA, KS 67203
COUNTY:	SEDGWICK
CITY:	WICHITA
ARCHITECT:	SCHAEFER ARCHITECTURE, INC.
HANDICAP PROVISIONS:	PATH OF TRAVEL, RESTROOMS, EXITS
WATER SUPPLY:	CITY OF WICHITA
SEWAGE TREATMENT:	CITY OF WICHITA
GAS:	KANSAS GAS
ELECTRICITY:	EVERGY
USE:	ELECTIONS AND RECORDS MANAGEMENT
AUTHORITY HAVING JURISDICTION:	CITY OF WICHITA
LOCAL FIRE:	CITY OF WICHITA
LOCAL CODE ENFORCEMENT:	MABCD
AREA OF RENOVATION:	8,154 S.F.
TOTAL BUILDING AREA:	46,165 S.F.

1

PROJECT CERTIFICATION

ARCHITECT: SCHAEFER ARCHITECTURE, INC.
I CERTIFY THAT THE SUBMITTED PLANS FOR THE PROJECT REFERENCED ABOVE COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING:

BUILDING
- 2024 INTERNATIONAL BUILDING CODE
- 2024 INTERNATIONAL EXISTING BUILDING CODE
- 20218 INTERNATIONAL FIRE CODE

ELECTRICAL
- 2023 NATIONAL ELECTRIC CODE (NFPA 70)

MECHANICAL
- 2024 INTERNATIONAL MECHANICAL CODE
- 2021 INTERNATIONAL FUEL AND GAS CODE

PLUMBING
- 2021 UNIFORM PLUMBING CODE
- 2021 INTERNATIONAL FUEL GAS CODE
- 2010 ADAAG ACCESSIBILITY GUIDELINES FOR BUILDINGS & FACILITIES
- 1997 KANSAS FIRE PREVENTION CODE

PER 2006 IBC SECTION 104.11, THE KANSAS STATE FIRE MARSHAL ACCEPTS APPLICATION OF THE 2018 IBC TO THIS PROJECT AS PROVIDING AN EQUIVALENT LEVEL OF MINIMUM LIFE SAFETY AS REQUIRED BY THE KANSAS FIRE PREVENTION CODE.

GENERAL NOTES

- ALL BUILDINGS ARE TO BE EQUIPPED WITH THE FOLLOWING:
  HVAC SYSTEM: AIR HANDLERS
  FUEL: NATURAL GAS

  FIRE SAFETY:
  - FIRE ALARM SYSTEM
  - FIRE EXTINGUISHER
  - EXIT LIGHTS
  - EMERGENCY LIGHTS

  ACTIVE FIRE SAFETY SYSTEM:
  - FIRE ALARM SYSTEM PROVIDED
  - SMOKE DETECTION PROVIDED AT RATED DOORS W/ HOLD OPENS AND HVAC EQUIPMENT ABOVE 2000 CFM
  - EXIT LIGHTS AND EMERGENCY LIGHTS PROVIDED W/ BATTERY BACKUP

  PASSIVE FIRE SAFETY SYSTEM:
  - 1 HR RATED CORRIDOR @ EXISTING BUILDING
  - 3 HR RATED SEPARATION @ EXISTING BUILDING

- FIRE PREVENTION CODE KSA 31-133 AND 31-1354a. MOST BUILDINGS NEW OR EXISTING HAVE ONE OR MORE DEVIATIONS FROM ONE OF THE RECOGNIZED BUILDING CODES. STATE LAW MANDATES COMPLIANCE TO THE KANSAS FIRE PREVENTION CODE (KFPC) IN ALL OCCUPIED STRUCTURES.

  STATE LAW CAN BE SUMMARIZED AS:
  a) EXISTING STRUCTURE CANNOT HAVE 'DISTINCTLY HAZARDOUS CONDITIONS' - THOSE THAT IMPEDE SPEEDY EXIT;
  b) NEW CONSTRUCTION AND CHANGES IN OCCUPANCY SHALL COMPLY TO CURRENT STANDARDS;
  c) ADDITION OR CHANGES IN EXISTING BUILDING CANNOT MAKE THE EXISTING CONDITION WORSE OR BLOCK EXITING.

- MOST CORRECTION TO DISTINCTLY HAZARDOUS CONDITIONS COMPENSATE FOR IMPAIRED EXITING. MANY COMPENSATORY MEASURES ACCEPTABLE TO THE KANSAS STATE FIRE MARSHAL'S OFFICE DO NOT UPGRADE THE BUILDING TO MEET THE LETTER OF A BUILDING, FIRE OR LIFE SAFETY CODE. EXISTING PORTIONS OF MANY BUILDINGS DO NOT COMPLY WITH A CERTAIN BUILDING CODE AND SHOULD BE SPECIFIED AS MEETING THE KANSAS FIRE PREVENTION CODE.

PLUMBING FIXTURES

REQUIRED FIXTURES FOR 406 OCCUPANTS (IBC TABLE 2902.1) USING B:

	WATER CLOSETS	LAVS	DRINKING FOUNTAINS
MEN	1 PER 25 = 5	1 PER 40 = 4	1 PER 100 = 5
WOMEN	1 PER 25 = 5	1 PER 40 = 4	

ACTUAL FIXTURES:

	WATER CLOSETS	LAV'S	DRINKING FOUNTAINS
MEN	11	11	6
WOMEN	6	7	

SYMBOL LEGEND

INDICATES THE OCCUPANCY LOAD OF A SPECIFIC ROOM OR AREA REQUIRING TWO OR MORE EXITS

INDICATES THE OCCUPANCY LOAD OF A SPECIFIC ROOM OR AREA REQUIRING ONE EXIT

INDICATES THE OCCUPANT LOAD EXITING FROM THE BUILDING

OCCUPANT LOAD FROM A TRIBUTARY AREA OF THE ADJACENT FLOOR ABOVE OR BELOW

HORIZONTAL EXIT

Name Of Room
MAX OCCUPANCY 150 SF (300)
- # OF OCCUPANTS
- ROOM AREA
- OCCUPANT LOAD FACTOR

Name Of Room
MAX OCCUPANCY 150 SF (300)
- # OF OCCUPANTS
- ROOM AREA
- OCCUPANT LOAD FACTOR

100 / 2 / 20" / 34"
- LOCATION OF EXIT
- # OF OCCUPANTS
- EGRESS WIDTH PER OCCUPANT
- REQ'D WIDTH
- ACTUAL WIDTH

23 / H

EXISTING FIRE EXTINGUISHER — FE
EXISTING FIRE EXTINGUISHER CABINET — FEC
FIRE DEPARTMENT CONNECTION — FDC
FIRE ALARM ANNUNCIATOR PANEL — FAAP
FIRE ALARM CONTROL PANEL — FACP
EXISTING 2HR FIRE WALL
EXISTING 1HR FIRE PARTITION
EXISTING 3HR FIRE BARRIER
LINE OF EXIT PATH

EXISTING NON-COMPLIANT 1-HR CORRIDOR
REMODEL AREA

U.L. DATA

FOR OPENINGS IN 1-HR WALLS
- 1-HR. WOOD STUDS - INTERIOR PARTITION WITH GYPSUM WALLBOARD EACH SIDE U.L. IBC TABLE 721.1(2)

1

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SEDGWICK COUNTY
ELECTIONS AND RECORDS MANAGEMENT
REMODEL
3639 N. Comotara St., Wichita, KS 67226

REVISIONS
1 AD 1 11.03.2025

PROJECT NUMBER
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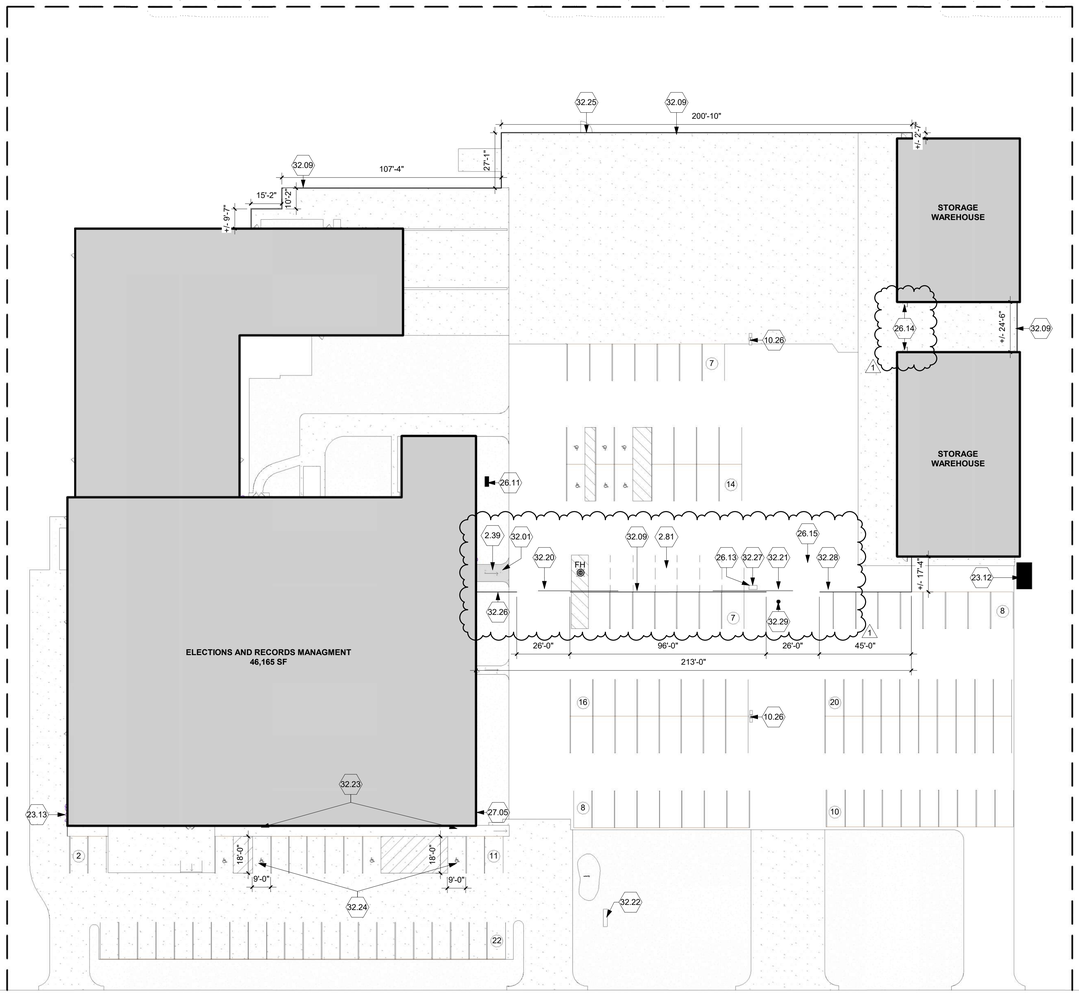
DATE
10.16.25

CODE COMPLIANCE

G14.1



A SITE PLAN
1" = 30'-0"

SHEET SCALE

0' 5' 10' 20' 40'

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

- CONTRACTOR TO VERIFY EXISTING SITE & BUILDING CONDITIONS.
- PROPERTY LINE SHOWN ON ARCHITECTURAL SITE PLAN IS APPROXIMATE. CONTRACT TO VERIFY WOKR IS DONE WITHIN PROPERTY BOUDNARIES.
- WORK ADJACENT TO PROPERTIES SHALL BE CORRDINATED W/ PROPERTY OWNERS.
- FOR EXISTING SITE INFORMATION, REF. MOST RECENT SURVEY DOCUMENT.
- FOR ELECTRICAL SERVICE CONNECTION @ BUILDING, REF. ELEC.
- FOR SITE LIGHTING, REF. ELEC.
- FOR SEWER SERVICE CONNECTION @ BUILDING, REF. PLUMBING.
- PAVING CONTRACTOR TO VERIFY EXISTING SITE AND BUILDING CONDITIONS PRIOR TO BIDDING; SURVEY EXISTING PAVING ELEVATIONS AND SUBMIT A PLAN SHOWING PROPOSED SLOPES AT NEW SIDEWALKS TO ARCHITECT FOR REVIEW AND APPROVAL
- PORTIONS OF RETAINING/ PLANTER WALLS THAT BECOME EXPOSED TO VIEW DUE TO RECONFIGURATION OF SITE STAIRS SHALL BE CLEANED UP, PATCHED, AND THE SURFACE TREATED TO BLEND WITH ADJACNET CONCRETE WALL SURFACES. METHODS MIGHT INCLUDE A LIGHT SANDBLAST OVER THE ENTIRETY OF THE WALLS; PRIOR APPROVAL REQUIRED BY OWNER.
- ABBREVIATIONS:
  - CJ CONTROL JOINT - REF. DETAIL
  - VIF VERIFY IN FIELD ACTUAL CONDITIONS

SITE LEGEND

- EXISTING CONCRETE
- EXISTING ASPHALT
- EXISTING GRASS
- NEW CONCRETE

SYMBOL LEGEND

- PROPERTY LINE
- FIRE HYDRANT — FH
- BUILDING OUTLINES

KEYNOTES

2.39	EXISTING CONCRETE RAMP TO BE REMOVED IN ITS ENTIRETY.
2.81	EXISITING PARKING STRIPING TO BE REMOVED.
10.26	EXISTING LIGHT POLE.
23.12	EXISTING TRANSFORMER.
23.13	EXISTING GAS METER.
26.11	EXISTING JUNCTION BOX.
26.13	CONDUIT FROM BUILDING TO GATE MOTOR - REF. ELEC.
26.14	REMOVE EXISTING AC AND PROVIDE NEW AC AT STORAGE WAREHOUSE.
26.15	NEW EXIT LOOP - REF. ELEC.
27.05	EXISTING FIBER LINE.
32.01	CONCRETE RAMP - REF. DETAILS
32.09	6' HIGH/ CHAIN LINK FENCE - REF. SPEC.
32.20	26' CANTILEVER SLIDING MANUAL GATE - REF. SPEC.
32.21	26' CANTILEVER SLIDING ELECTRICAL GATE - REF. SPEC.
32.22	REMOVE BOTH PANELS ON EXISTING DUAL-SIDED MONUMENTAL SIGN. PROVIDE AND INSTALL NEW SIGANGE 46" X 93" ON BOTH SIDES. VERIFY DESIGN WITH OWNER.
32.23	ADA SIGNAGE WALL MOUNTED - REF. SITE DETAILS AND SPEC.
32.24	NEW ACCESSIBLE PARKING STALLS; REF. SITE DETAILS FOR PAINTED PAVEMENT MARKINGS
32.25	6'x6' WIDE SWINGING GATE - REF. SPEC.
32.26	KNOX BOX - COORDINATE LOCATION WITH FIRE DEPARTMENT AND OWNER, REF. SPEC.
32.27	SLIDE GATE OPERATOR - REF. SPEC.
32.28	EXIT BUTTON - REF. SPEC.
32.29	ACCESS CONTROL ON PEDESTAL - REF. DETAILS AND SPEC.

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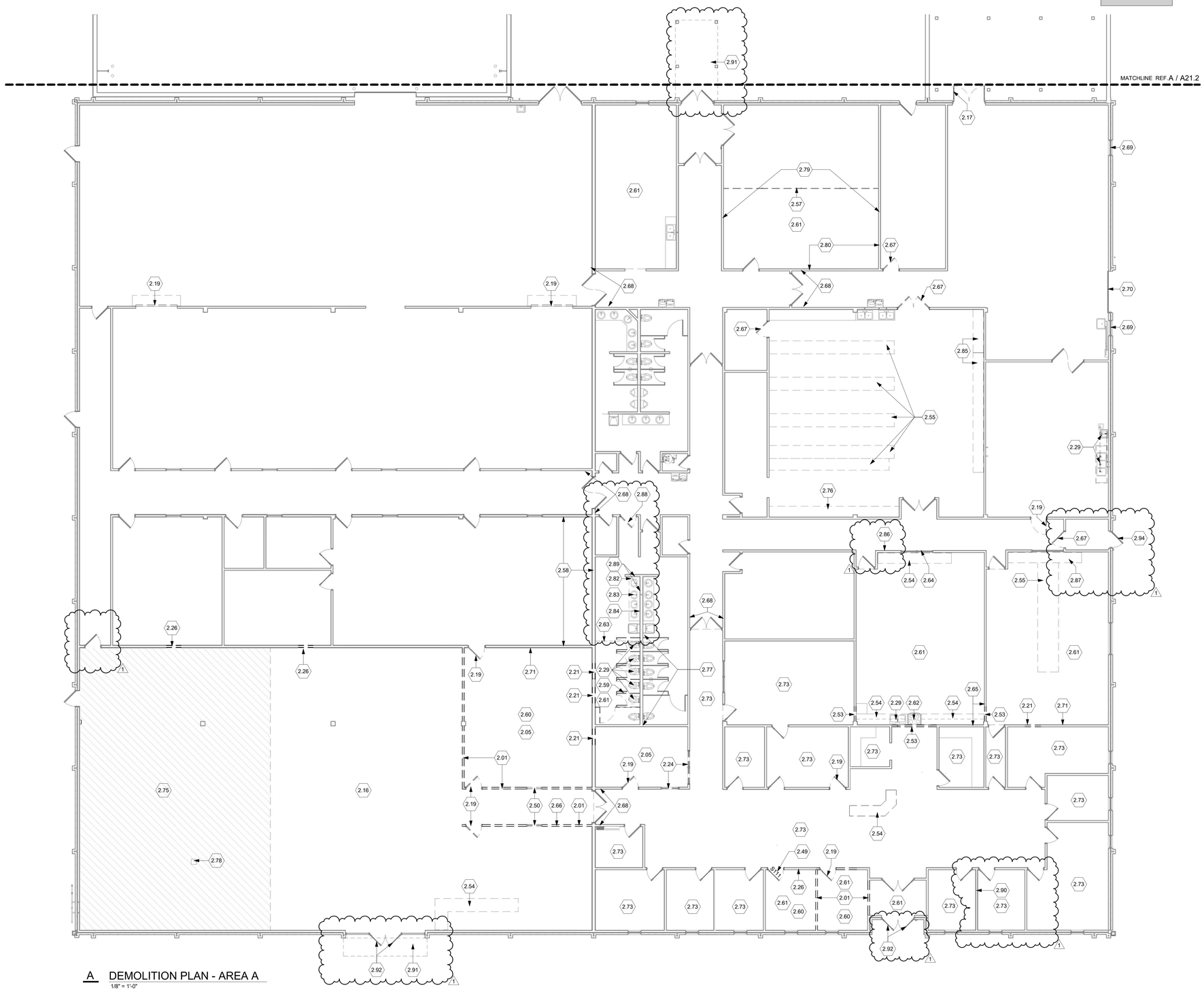
SITE PLAN

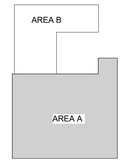
A20.1



A DEMOLITION PLAN - AREA A

1/8" = 1'-0"

KEY PLAN



SHEET SCALE

0' 4' 8' 16'

N

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

- G.C. SHALL VERIFY ALL EXISTING SITE AND BUILDING CONDITIONS PRIOR TO BID.
- REF. 'ALTERATIONS' AND 'CUTTING AND PATCHING' IN 01 70 00 OF THE SPEC.
- THIS SHEET IS INTENDED FOR GENERAL INFORMATION. G.C. SHALL BE RESPONSIBLE FOR REMOVING EQUIPMENT AND DEVICES, CUT AND PATCH WORK, ETC.; NECESSARY FOR NEW AND REMODEL CONSTRUCTION. COORDINATE WORK ON DEMO SHEETS WITH WORK ON FLOOR PLAN SHEETS. REF. MECH. AND ELEC. FOR DEMO. AND CUT AND PATCH WORK REQUIRED BY MECH. AND ELEC. WORK.
- DASHED LINES REPRESENT ITEMS FOR REMOVAL OR RELOCATION - REF. KEYED NOTES
- OWNER SHALL HAVE FIRST SALVAGE RIGHTS ON ALL ITEMS REMOVED FROM BLDG. G.C. SHALL VERIFY ALL ITEMS TO BE SALVAGED WITH OWNER AND COORDINATE WITH OWNER AS REQUIRED. ITEMS TO BE SALVAGED ARE TO BE REMOVED TO A LOCATION ON SITE AS DESIGNATED BY OWNER. ITEMS NOT SALVAGED SHALL BE REMOVED AND DISPOSED BY CONTRACTOR. SUCH ITEMS SHALL INCLUDE BUT ARE NOT LIMITED TO: FURNITURE, CABINETS, DEVICES, EQUIPMENT, PLUMBING, MECHANICAL ETC..
- CONTRACTOR SHALL CUT AND PATCH FLOORS, WALLS, CEILINGS, AND ROOFS AS REQUIRED FOR PLACEMENT OF NEW PIPING, CONDUITS, DEVICES, STRUCTURE, ETC. REF. ALL PLANS FOR LOCATIONS.
- G.C. SHALL PROTECT ALL STRUCTURAL ELEMENTS IN BUILDINGS TO REMAIN.
- G.C. SHALL VERIFY ALL NEW OPENINGS FOR PIPING, DUCTS, AND CONDUIT WITH THE EXISTING STRUCTURAL SYSTEM OF THE BUILDING. DO NOT CUT THROUGH CONCRETE FLOOR/ROOF BEAMS, CONCRETE FLOOR/ROOF JOISTS, CONCRETE COLUMNS, STEEL COLUMNS, OR STEEL ROOF JOISTS UNLESS NOTED ON THE PLANS.
- G.C. SHALL PROTECT ALL EXIST. BUILDING COMPONENTS AND FINISHES TO REMAIN. G.C. SHALL REPAIR DAMAGE TO EXIST. BUILDING COMPONENTS AND FINISHES TO REMAIN.
- CONTRACTOR SHALL PATCH, REPAIR AND PAINT ALL SURFACES RESULTING FROM DEMOLITION WORK. ALL PATCHES ARE TO MATCH ADJACENT FINISHES AS CLOSELY AS POSSIBLE. WALL OR FLOOR SURFACES WHERE MILLWORK, ELECTRICAL DEVICES OR MECHANICAL EQUIPMENT IS REMOVED SHALL BE PATCHED AND PAINTED.
- CONTRACTOR SHALL REMOVE ALL EXISTING SWITCHES, OUTLETS, FIRE ALARM DEVICES, INTERCOM DEVICES, SPEAKERS, HOLD-OPENS, POWER STRIPS ETC., WHICH ARE NOT RECONNECTED. PROVIDE STAINLESS STEEL COVER PLATES OVER J-BOXES WHICH ARE NO LONGER BEING USED. REMOVE ALL EXPOSED CONDUIT/WIRE MOLD WHICH IS NO LONGER BEING USED - PATCH AND PAINT WALL.
- CONTRACTOR SHALL REMOVE ALL MECH./PLUMBING EQUIPMENT AND PIPING WHICH IS NOT RECONNECTED. SUCH ITEMS SHALL INCLUDE BUT NOT LIMITED TO: VENTS, RADIATORS, VENTILATORS, WATER AND STEAM SUPPLY AND RETURN LINES, SEWER LINES, GAS LINES, INSULATION, ESCUTCHEONS, ELECTRICAL CONNECTIONS, AND ASSOCIATED CONSTRUCTION EXPOSED TO VIEW. CAP LINES AS REQUIRED. PIPING IN TUNNELS TO REMAIN UNLESS NOTED OTHERWISE.
- REFER TO MECHANICAL AND ELECTRICAL DEMOLITION SHEETS FOR ADDITIONAL INFORMATION ON MECHANICAL AND ELECTRICAL DEMOLITION WORK.
- FLOORING TO BE REMOVED SHALL BE REMOVED TO CONCRETE (OR EXIST. SUB-FLOOR STRUCTURE). ALL GLUE, GROUT, AND RESIDUE SHALL BE REMOVED TO PROVIDE A CLEAN BARE SURFACE.
- G.C. SHALL SALVAGE AND STOCKPILE BUILDING PRODUCTS FROM DEMOLITION TO BE USED FOR PATCHWORK. SUCH ITEMS SHALL INCLUDE BUT ARE NOT LIMITED TO WALL TILE, DOORS, CEILING TILE, LIGHT FIXTURES, MECHANICAL DIFFUSERS, MOLDING, TRIM, SPECIAL EQUIPMENT, ETC. - REF. SPECIFICATIONS.
- ALL CHALKBOARDS, TACKBOARDS, PROJECTION SCREENS, BLINDS, ETC. ARE TO BE REMOVED FROM AREAS BEING REMODELED IF THEY CONFLICT WITH THE WORK WHETHER NOTED ON PLANS OR NOT. WALL SURFACES BEHIND BOARDS ARE TO HAVE GLUE REMOVED AND PATCHED AS REQUIRED TO MATCH ADJACENT SURFACES WHERE LEFT EXPOSED. G.C. SHALL VERIFY ITEMS TO BE SALVAGED.
- ALL TOILET ACCESSORIES SHALL BE REMOVED FROM RESTROOMS TO BE DEMOLISHED. G.C. SHALL VERIFY ITEMS TO BE SALVAGED.
- CONTRACTOR SHALL REMOVE ALL ABANDONED GAS PIPING SYSTEMS IN REMODEL AREAS WHERE GAS IS NO LONGER NEEDED. THIS SHALL INCLUDE BUT IS NOT LIMITED TO FORMER SCIENCE ROOMS, SHOPS, ART ROOMS, OR KITCHENS THAT REMODEL INTO ROOMS NOT REQUIRING GAS. PLUG LINES OUT OF VIEW & PATCH PENETRATIONS - REF. MECH.

KEYNOTES

2.01	EXISTING WALL TO BE REMOVED IN ITS ENTIRETY. PATCH FLOOR AND WALL. PAINT ADJACENT WALLS AS REQUIRED TO MATCH ADJACENT SURFACES WHERE LEFT EXPOSED. REMOVE ALL ELECTRICAL DEVICES AND REMOVE WIRING BACK TO ITS SOURCE.
2.05	EXISTING CARPET FLOORING IN ROOM TO BE REMOVED TO SURFACE OF CONCRETE; INCLUDING MASTIC AND RESILIENT BASE. PREP SURFACE FOR NEW FLOORING AS REQUIRED.
2.16	EXISTING CEILING FINISH TO REMAIN. PROTECT WALL AS REQUIRED.
2.17	EXISTING DOOR AND FRAME TO BE REMOVED IN ITS ENTIRETY. PREP. OPENING FOR NEW DOOR AND FRAME. PATCH AND PAINT HEAD, JAMBS, AND FLOOR AS REQUIRED TO MATCH ADJACENT FINISH.
2.19	EXISTING DOOR AND FRAME TO BE REMOVED IN ITS ENTIRETY. PREP. OPENING FOR NEW 5/8" GYP. BD. ON 2x4 WOOD STUD @ 16" O.C. WALL INFILL. PATCH AND PAINT AS REQUIRED TO MATCH ADJACENT FINISH.
2.21	CUT OPENING IN EXISTING METAL STUD WALL AS REQUIRED FOR NEW DOOR AND FRAME. PROVIDE NEW LINTEL - REF. STRUCT. PATCH AND PAINT HEAD, JAMBS, AND FLOOR AS REQUIRED TO MATCH ADJACENT FINISH.
2.24	EXISTING WINDOW TO BE REMOVED IN ITS ENTIRETY. PREP. OPENING FOR NEW 5/8" GYP. BD. ON 2X4 WOOD STUD WALL @ 16" O.C. INFILL. PATCH AND PAINT AS REQUIRED TO MATCH ADJACENT FINISH.
2.26	CUT OPENING IN EXISTING METAL STUD WALL AS REQUIRED FOR NEW WINDOW. PROVIDE NEW LINTEL - REF. STRUCT. PATCH AND PAINT HEAD, JAMBS, AND FLOOR AS REQUIRED TO MATCH ADJACENT FINISH.
2.29	EXISTING PLUMBING FIXTURE TO BE REMOVED IN ITS ENTIRETY. TERMINATE SEWER PIPE BELOW FLOOR SLAB AS REQUIRED AND PATCH FLOOR SLAB. TERMINATE WATER LINES BACK TO NEAREST MAIN. PATCH & PAINT WALL AS REQUIRED.
2.49	EXISTING DOOR AND FRAME TO BE REMOVED IN IT'S ENTIRETY. SALVAGE DOOR AND HARDWARE TO BE REUSED.
2.50	EXISTING WINDOW TO BE REMOVED IN ITS ENTIRETY.
2.53	CUT OPENING IN EXISTING WOOD STUD WALL AS REQUIRED FOR NEW OPENING. PATCH AND PAINT HEAD, JAMBS, AND FLOOR AS REQUIRED TO MATCH ADJACENT FINISH.
2.54	EXISTING MILLWORK TO BE REMOVED IN IT'S ENTIRETY.
2.55	EXISTING MILLWORK TO BE SALVAGED AND REUSED.
2.57	EXISTING FENCE TO BE REMOVED IN IT'S ENTIRETY.
2.58	EXISTING 4X4 ACOUSTICAL PANEL TO BE REMOVED AND SALVAGED FOR REUSE. RELOCATE TO ROOM 119 & 120.
2.59	EXISTING TOILET PARTITIONS TO BE REMOVED IN IT'S ENTIRETY.
2.60	EXISTING 2X4 ACT TO BE REMOVED. EXISTING GRID AND LIGHTS TO BE SALVAGED.
2.61	EXISTING FLOORING TO BE REMOVED IN IT'S ENTIRETY. PREP SURFACE FOR NEW FLOORING AS REQUIRED.
2.62	EXISTING OVEN TO BE REMOVED IN IT'S ENTIRETY.
2.63	EXISTING CEILING TO BE PARTIALLY REMOVED.
2.64	EXISTING BLINDS TO BE REMOVED IN IT'S ENTIRETY.
2.65	EXISTING WALL PANEL TO BE REMOVED IN IT'S ENTIRETY. PATCH AND PAINT AS REQUIRED TO MATCH ADJACENT FINISH.
2.66	EXISTING FIRE EXTENGUISHER CABINET TO BE REMOVED IN ITS ENTIRETY. SALVAGE FIRE EXTENGUISHER TO BE RELOCATED.
2.67	EXISTING DOOR TO BE REMOVED. FRAME TO REMAIN. PATCH AND REPAIR.
2.68	EXISTING HOLD-OPEN ON DOOR TO BE REMOVED.
2.69	EXISTING WINDOW FRAME TO REMAIN. REMOVE GLASS AND PREP FOR NEW PANEL - REF. ELEVATIONS AND SPEC.
2.70	CONCRETE SILL TO BE REMOVED.
2.71	EXISTING MARKER BOARD AND WALL MOUNTED PROJECTOR SCREEN TO BE REMOVED.
2.73	ALTERNATE 1: EXISTING FLOOR AND BASE TO BE REMOVED IN IT'S ENTIRETY. PREP SURFACE FOR NEW FLOORING AS REQUIRED.
2.75	EXISTING UPPER CEILING TO REMAIN. LOWER 8'-0" CEILING TO BE REMOVED IN IT'S ENTIRETY. LIGHTS AND TILE TO BE SALVAGED AND REUSED.
2.76	EXISTING MILLWORK TO BE SUBDIVIDED INTO SMALLER PORTIONS TO BE SALVAGED AND REUSED IN BREAK ROOMS.
2.77	EXISTING TILE COVE BASE BENEATH WATER CLOSETS TO BE REMOVED. PREP FOR NEW TILE COVE BASE.
2.78	REMOVE POWER POLE.
2.79	REMOVE MDF BOARD. PATCH AND REPAIR WALL.
2.80	EXISTING BASE TO BE REMOVED IN AFFECTED AREA.
2.82	EXISTING COUNTERTOP TO BE REMOVED IN IT'S ENTIRETY.
2.83	EXISTING SINKS TO BE REMOVED IN IT'S ENTIRETY. SALVAGE 2 FAUCETS FOR REUSE IN THE ADJACENT WOMENS RESTROOM. REMOVE PLUMBING BACK TO WALL AND CAP. REF. PLUMBING.
2.84	EXISTING MIRROR TO BE SALVAGED AND REUSED IN THE ADJACENT WOMENS RESTROOM. PATCH AND REPAIR WALL.
2.85	EXISTING MILLWORK TO BE SALVAGED AND REUSED IN THE NEW TRAINING ROOM.
2.86	EXISTING RECORDING SIGN TO BE REMOVED.
2.87	EXISTING COUNTERTOP TO BE SALVAGED FOR REUSE. BASE CABINETS TO BE REMOVED IN ROOM 124A.
2.88	EXISTING DOOR TO BE SALVAGED FOR REUSE. EXISTING HARDWARE TO BE REMOVED AND PREP FOR NEW HARDWARE. CLOSER TO BE REMOVED. REMOVE FRAME AND PREP FOR NEW.
2.89	EXISTING WALL TILE AND TILE BACKER BOARD TO BE REMOVED.
2.90	ALTERNATE 1: EXISTING WALL TO BE PARTIALLY REMOVED TO A HEADER.
2.91	EXISTING AWNING COVER TO BE REMOVED.
2.92	EXISTING VINYL DECAL TO BE REMOVED.
2.94	EXISTING DOOR HARDWARE TO BE REMOVED AND PREP FOR NEW.

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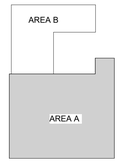
DEMOLITION PLAN - AREA A

A21.1

KEY PLAN



SHEET SCALE

0' 4' 8' 16' N

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

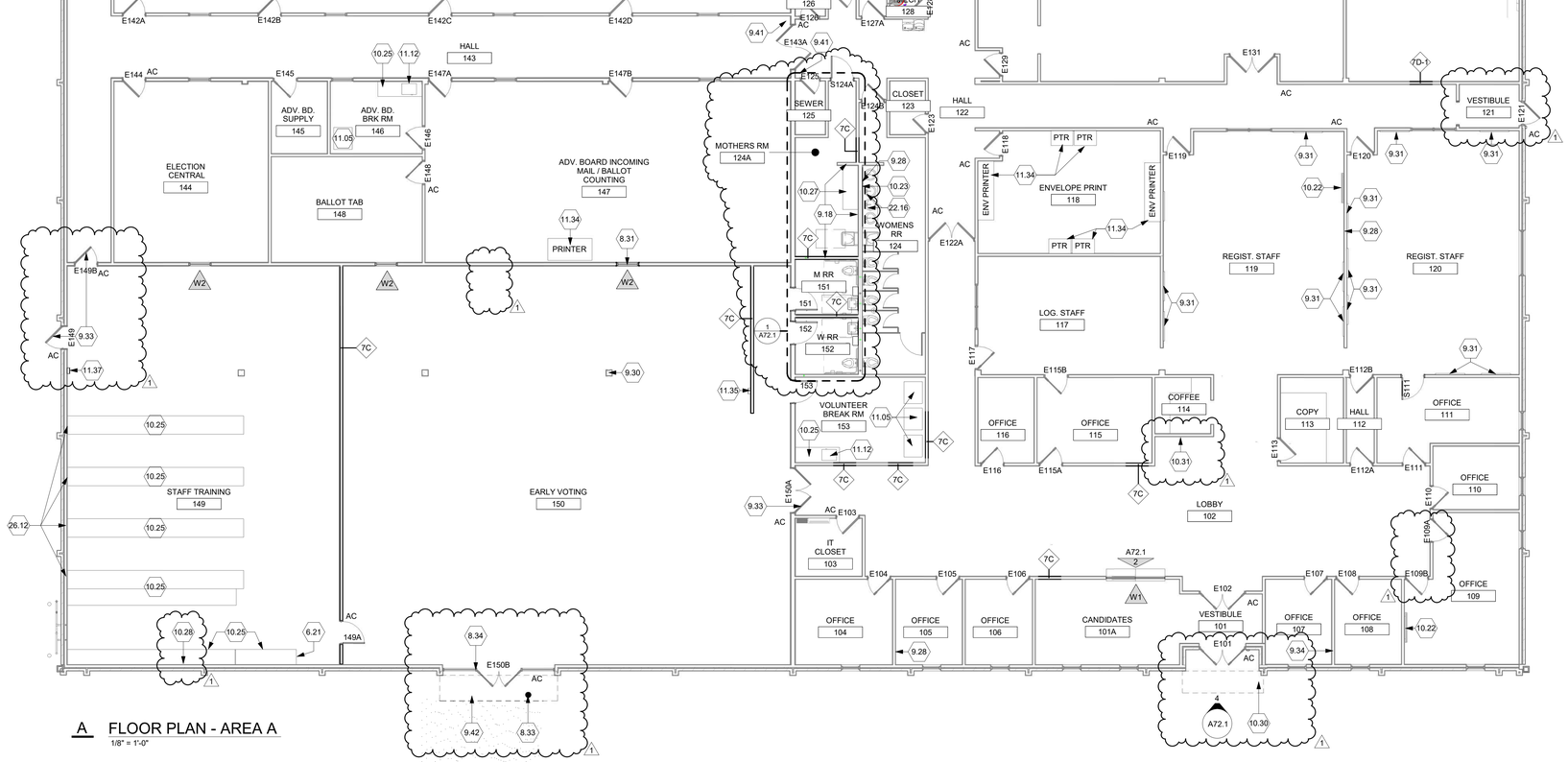
GENERAL NOTES

- CONTRACTOR TO VERIFY EXISTING SITE AND BUILDING CONDITIONS PRIOR TO BIDDING
- REFERENCE SHEET G10.1 FOR GRAPHIC SYMBOL AND DRAWING SYMBOL DEFINITIONS.
- HATCHED WALL WITH DARK (BLACK) PERIMETER LINES INDICATE NEW WALLS. EXISTING WALLS SHOWN WITH SCREENED (GRAY) LINES WITH NO FILL.
- SEE ENLARGED PLANS FOR ALL ACCESSORY LOCATIONS THAT REQUIRE IN-WALL BLOCKING FOR ATTACHMENT.
- SEE ALL MILLWORK DETAILS FOR ALL CASEWORK GOODS THAT REQUIRE IN-WALL BLOCKING FOR ATTACHMENT.
- PROVIDE 1" BULLNOSE ON ALL EXPOSED CMU CORNERS, UNLESS NOTED OTHERWISE. PROVIDE SQUARE CMU CORNERS AT TILED WALLS.
- ABBREVIATIONS:

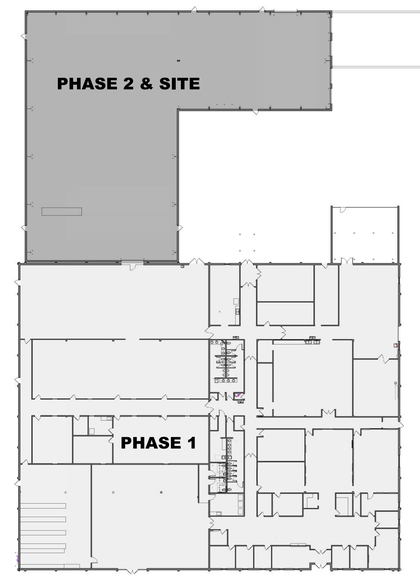
CJ	CONTROL JOINT - REF. DETAIL
FEC	FIRE EXTINGUISHER AND CABINET - REF. SPEC.
FE	FIRE EXTINGUISHER AND BRACKET - REF. SPEC.
MB	MARKER BOARD
TB	TACKBOARD
TS	TACKSTRIP
PS	PROJECTION SCREEN - REF. SPEC.
IDB	INTERACTIVE DISPLAY BOARD - REF. SPEC. AND ELECTRICAL
RS	ROLLER SHADES - REF. SPEC.
BL	WINDOW BLINDS - REF. SPEC.
NIC	NOT IN CONTRACT, ITEM PROVIDED AND INSTALLED BY OWNER
VIF	VERIFY IN FIELD ACTUAL CONDITIONS
AC	ACCESS CONTROL - REF. SPEC. AND ELECTRICAL

KEYNOTES

3.30	NEW CONCRETE SILL. REF. DETAILS.
6.21	ADD PLAM TO EXPOSED SIDE OF RELOCATED MILLWORK - REF. SCHEDULE AND SPEC.
8.31	INFILL WALL BELOW NEW WINDOW - REF. PARTITION SCHEDULE
8.32	EXISTING WINDOW FRAME WITH INFILL PANEL - REF. WINDOW SCHEDULE AND SPEC.
8.33	DOOR OPENER PUSH BUTTON ON PEDESTAL, 42" CLEAR FROM DOOR - REF. DETAILS AND SPEC.
8.34	DOOR OPENER PUSH BUTTON ON MULLION.
8.35	OWNER PROVIDED CHAINLINK FENCE AND GATE.
9.18	WALL FINISH AS SCHEDULED
9.28	PATCH AND PAINT WALL TO MATCH ADJACENT FINISH.
9.30	PATCH COLUMN TO MATCH ADJACENT FINISH.
9.31	RELOCATED 4'x4' ACCOUSTIC PANELS.
9.33	PAINT INTERIOR SIDE OF EXISTING DOOR.
9.34	NEW TILE COVE BASE - REF. SCHEDULE AND SPEC.
9.41	PATCH AND REPAIR FLOOR FROM EXISITNG DOOR HOLD OPEN.
9.42	NEW AWNING COVER. REF. SPEC.
10.22	TELEVISION - PROVDED AND INSTALLED BY OWNER. BLOCKING INSTALLED BY G.C.
10.23	RELOCATED MIRROR.
10.25	RELOCATED MILLWORK.
10.27	RELOCATED COUNTERTOP.
10.28	PROJECTOR SCREEN - PROVIDED AND INSTALLED BY GC. - REF. SPEC.
10.30	PREFABRICATED FIXED FRAME AWNING - REF. ELEVATION AND SPEC.
10.31	ELECTIONS SIGNAGE. PROVIDED BY OWNER AND INSTALLED BY GC. MOUNTED TOP OF SIGN 60" A.F.F. - VERIFY WITH ARCHITECT
11.05	REFRIGERATOR - PROVIDED AND INSTALLED BY OWNER. POWER PROVIDED BY G.C. - REF. ELEC.
11.12	MICROWAVE - PROVIDED AND INSTALLED BY OWNER. POWER PROVIDED BY G.C. - REF. ELEC.
11.34	PRINTER - PROVIDED AND INSTALLED BY OWNER. POWER AND DATA PROVIDED BY G.C. - REF. ELEC.
11.35	RELOCATED FIRE EXTENGUISHER CABINET TO BE PAINTED.
11.37	PAINT EXISTING FEC.
22.16	RELOCATED FAUCETS - REF. PLUMBING.
26.12	PROVIDE ELECTRICAL FOR RELOCATED TABLE - REF. ELEC.



A FLOOR PLAN - AREA A
1/8" = 1'-0"



B PHASE PLAN
1/32" = 1'-0"

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SEDGWICK COUNTY
ELECTIONS AND RECORDS MANAGEMENT
REMODEL
3639 N. Comotara St., Wichita, KS 67226

REVISIONS
1 AD 1 11.03.2025

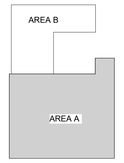
PROJECT NUMBER
5278.57

DATE
10.17.25

FLOOR PLAN - AREA A

A22.1

KEY PLAN



SHEET SCALE

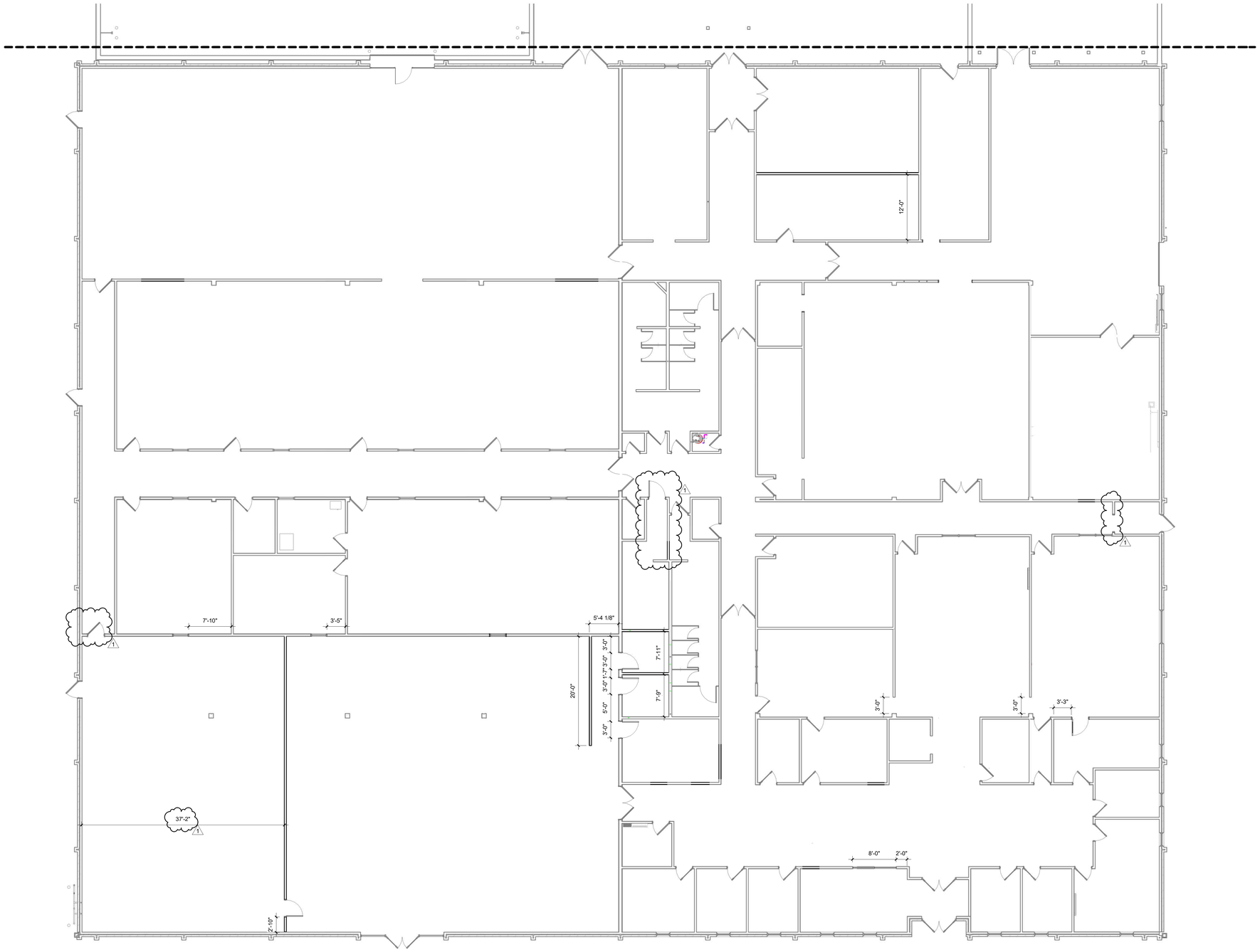
0' 4' 8' 16'

N

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

1. CONTRACTOR TO VERIFY EXISTING SITE AND BUILDING CONDITIONS PRIOR TO BIDDING.
2. DIMENSIONS:
   a. EXTERIOR
      - SLAB EDGE, UNLESS NOTED OTHERWISE
      - ROUGH OPENING EDGES, UNLESS NOTED OTHERWISE
   b. INTERIOR
      - TO FACE OF CMU OR CONCRETE, UNLESS NOTED OTHERWISE
      - TO FACE OF METAL STUD, UNLESS NOTED OTHERWISE
      - ROUGH OPENING EDGES, UNLESS NOTED OTHERWISE
      - TO CENTER OF STEEL COLUMN, UNLESS NOTED OTHERWISE



A DIMENSION PLAN - AREA A
1/8" = 1'-0"

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KEVIN E. SCHAEFER
4591
11/03/25
KANSAS
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REMODEL
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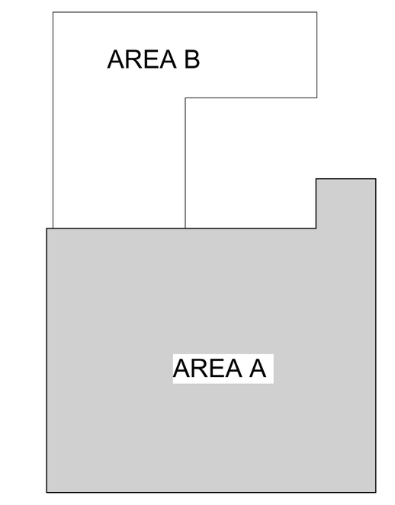
DIMENSION PLAN - AREA A

A22.1D

KEY PLAN



SHEET SCALE

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

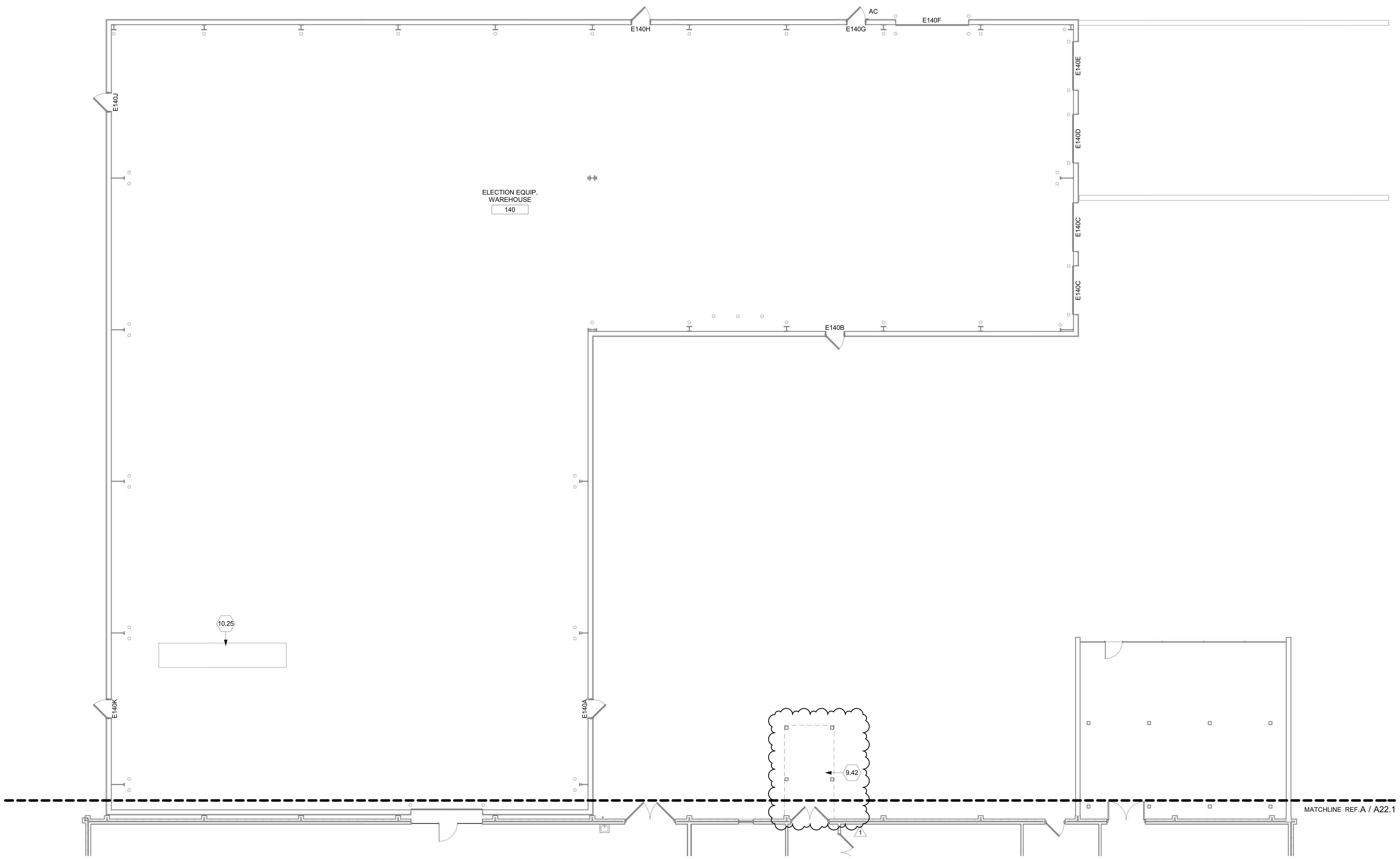
- CONTRACTOR TO VERIFY EXISTING SITE AND BUILDING CONDITIONS PRIOR TO BIDDING
- REFERENCE SHEET G10.1 FOR GRAPHIC SYMBOL AND DRAWING SYMBOL DEFINITIONS.
- HATCHED WALL WITH DARK (BLACK) PERIMETER LINES INDICATE NEW WALLS. EXISTING WALLS SHOWN WITH SCREENED (GRAY) LINES WITH NO FILL.
- SEE ENLARGED PLANS FOR ALL ACCESSORY LOCATIONS THAT REQUIRE IN-WALL BLOCKING FOR ATTACHMENT.
- SEE ALL MILLWORK DETAILS FOR ALL CASEWORK GOODS THAT REQUIRE IN-WALL BLOCKING FOR ATTACHMENT.
- PROVIDE 1" BULLNOSE ON ALL EXPOSED CMU CORNERS, UNLESS NOTED OTHERWISE. PROVIDE SQUARE CMU CORNERS AT TILED WALLS.
- ABBREVIATIONS:

CJ	CONTROL JOINT - REF. DETAIL
FEC	FIRE EXTINGUISHER AND CABINET - REF. SPEC.
FE	FIRE EXTINGUISHER AND BRACKET - REF. SPEC.
MB	MARKER BOARD
TB	TACKBOARD
TS	TACKSTRIP
PS	PROJECTION SCREEN - REF. SPEC.
IDB	INTERACTIVE DISPLAY BOARD - REF. SPEC. AND ELECTRICAL
RS	ROLLER SHADES - REF. SPEC.
BL	WINDOW BLINDS - REF. SPEC.
NIC	NOT IN CONTRACT, ITEM PROVIDED AND INSTALLED BY OWNER
VIF	VERIFY IN FIELD ACTUAL CONDITIONS
AC	ACCESS CONTROL - REF. SPEC. AND ELECTRICAL

KEYNOTES

9.42	NEW AWNING COVER. REF. SPEC.
10.25	RELOCATED MILLWORK.

1



A FLOOR PLAN - AREA B
1/8" = 1'-0"

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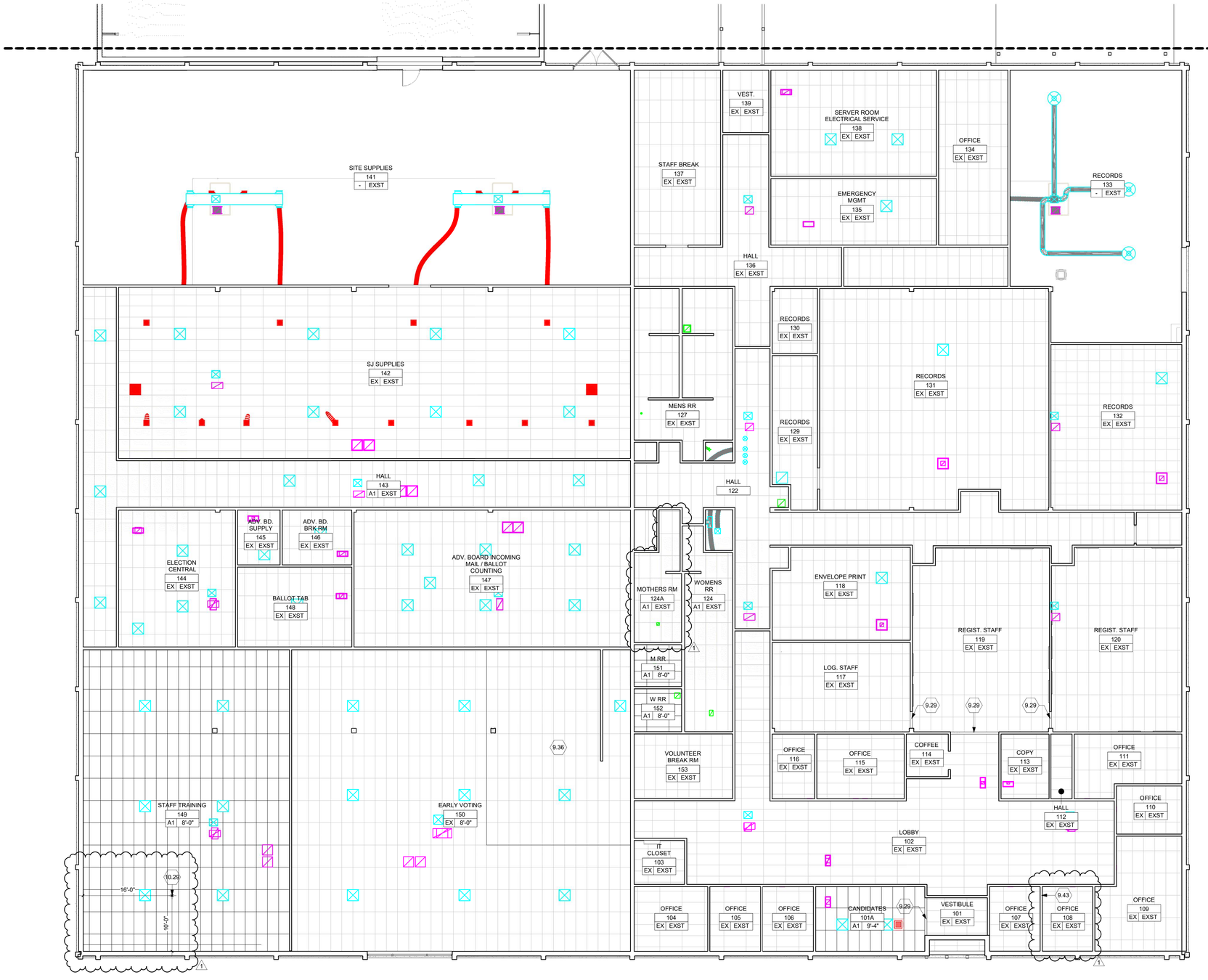
FLOOR PLAN - AREA B

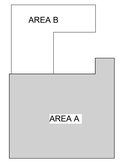
A22.2



A REFLECTED CEILING PLAN - AREA A

1/8" = 1'-0"

KEY PLAN



SHEET SCALE

0' 4' 8' 16' N

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCREPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

- CONTRACTOR TO VERIFY EXISTING BUILDING CONDITIONS PRIOR TO BIDDING.
- THIS SHEET IS FOR GENERAL INFORMATION ONLY. NOT ALL CEILING LIGHT FIXTURES, DEVICES, MECHANICAL DIFFUSERS, GRILLES, ETC. ARE SHOWN. REF. MECHANICAL AND ELECTRICAL FOR ADDITIONAL INFORMATION.
- ALL CONDUIT RUNS SHALL BE CONCEALED AT EXPOSED CEILINGS - REF. ELECTRICAL.
- SPRINKLER PIPE AT EXPOSED CEILINGS (EXCEPT STORAGE, MECHANICAL, LAUNDRY OR CUSTODIAL ROOMS): ONLY THE SPRINKLER LINES SERVING THE EXPOSED CEILING ROOM SHALL BE EXPOSED AND BE NEATLY ARRANGED WITH THE EXPOSED STRUCTURE OF THE ROOM. SPRINKLER PIPING SHALL BE HUNG FROM THE EXPOSED TOP FLANGE OF BEAMS OR JOISTS AND RUN PARALLEL WITH THE BEAM OR JOISTS. DO NOT HANG SPRINKLER PIPING FROM DECK. MAINS SHALL BE CONCEALED IN SOFFITS WHERE PROVIDED OR RUN IN ADJACENT ROOM AND HAVE ONLY THE EXPOSED SPRINKLER PIPES SERVING THAT ROOM BE EXPOSED.
- SPRINKLER PIPE AT STAGE: COORDINATE THE LOCATION OF SPRINKLER LINES WITH THE LINE SETS AND RUN PARALLEL WITH THE LINE SETS. THE MAIN SHALL RUN PERPENDICULAR TO THE LINE SETS AND RUN OPPOSITE OF THE RIGGING BLOCKS, TIGHT TO THE WALL.
- REFER TO WALL SECTIONS FOR HEIGHTS OF SOFFITS UNLESS NOTED.
- ALL GYPSUM BOARD SOFFITS SHALL HAVE PAINTED GYPSUM BOARD VERTICAL FACES UNLESS DETAILED OTHERWISE.
- COORDINATE INSTALLATION OF MECH. EQUIPMENT, DUCTS, LIGHTS AND SPRINKLER LINES WITH STRUCTURE TO MAINTAIN THE SCHEDULE CEILING HEIGHT. IT IS THE RESPONSIBILITY OF THE G.C. TO COORDINATE AMONG THE TRADES AND REPORT ANY DISCREPANCIES TO ARCHITECT PRIOR TO INSTALLATION.
- ALL EXPOSED DUCTWORK, PIPING, AND DECK SHALL BE PAINTED.
- ONLY CEILING FINISHES ARE DESIGNATED IN SYMBOLS. REFER TO ROOM FINISH SCHEDULE AND A28 SERIES SHEETS FOR ROOM FINISHES.
- USE SALVAGED ACOUSTICAL CEILING TILE TO REPLACE STAINED OR BROKEN CEILING TILES.

RCP SYMBOLS

- GYPSUM BD. SOFFIT/CEILING (PAINT)
- HVAC DIFFUSER / RETURN AIR GRILLE - REF. MECHANICAL
- LIGHT FIXTURE - REF. ELECTRICAL
- LIGHT FIXTURE - REF. ELECTRICAL
- LIGHT FIXTURE - REF. ELECTRICAL
- LIGHT FIXTURE - REF. ELECTRICAL

FINISH SCHEDULE GUIDE - RCP

CEILINGS:
X PAINT EXP. STRUCT.
- NO FINISH

ROOM NAME → ROOM NAME
101 → ROOM NUMBER
A 1'-0" → CEILING HEIGHT
CEILING FINISH

CEILING SCHEDULE

MARK	DESCRIPTION	REMARKS
A1	2x4 ACOUSTIC LAY-IN CEILING	
EX	EXISTING ACOUSTIC LAY-IN CEILING	

KEYNOTES

9.29	GYP. BD. HEADER AT 7'-2" A.F.F.
9.36	SALVAGED ACOUSTICAL TILE, GRID AND LIGHTING TIED INTO EXISTING CEILING.
9.43	ALTERNATE 1: GYP. BD. HEADER AT 7'-2" A.F.F.
10.29	PROJECTOR PROVIDED BY OWNER. GC. TO PROVIDE CEILING MOUNT AND INSTALL.

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REMODEL
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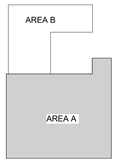
REFLECTED CEILING PLAN - AREA A

A23.1

A FINISH PLAN - AREA A

1/8" = 1'-0"

KEY PLAN



SHEET SCALE

0' 4' 8' 16'

N

NOTE:
- DO NOT SCALE DRAWINGS
- CONTRACTOR TO FOLLOW WRITTEN DIMENSIONS ONLY
- NOTIFY ARCHITECT OF ANY DISCEPANCIES FOUND AMONG THE DOCUMENTS & SITE CONDITIONS

GENERAL NOTES

- CONTRACTOR SHALL BE RESPONSIBLE TO BUILD TO FIELD CONDITIONS AND VERIFY ALL DIMENSIONS.
- FOR FLOOR FINISH TRANSITION DETAILS REFER TO A69 SERIES SHEETS.
- MANUFACTURER COLORS LISTED SHALL SET THE STANDARD. REF. SPEC. FOR APPROVED EQUALS. SUBSTITUTIONS MUST BE PRE-APPROVED PRIOR TO BIDDING.
- MATERIALS LEGEND AS INDICATED:

VCT - 1 12X12 VCT

TF - 1 RR TILE

CPT - 1 CARPET TILE BASE BID

CPT-2 CARPET TILE ALTERNATE 1

TW - 2 WALL TILE

KEYNOTES

9.32	FLOOR TRANSITION - REF. DETAILS AND SPEC.
9.33	PAINT INTERIOR SIDE OF EXISTING DOOR.
9.34	NEW TILE COVE BASE - REF. SCHEDULE AND SPEC.
9.38	ADD BASE TO MISSING AREAS.
9.39	MATCH PAINT AND TEXTURE TO ADJACENT WALL.
9.45	USE CPT-2 AND RB-2 IF ALTERNATE 1 IS ACCEPTED.

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR FINISH	BASE FINISH	WALL FINISH				REMARKS
				NORTH	EAST	SOUTH	WEST	
101	VESTIBULE	CPT - 1	RB - 1	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
101A	CANDIDATES	CPT - 1	RB - 1	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
102	LOBBY	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
103	IT CLOSET	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
104	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
105	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
106	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
107	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
108	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
109	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
110	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
111	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
112	HALL	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
113	COPY	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
114	COFFEE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	
115	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
116	OFFICE	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
117	LOG. STAFF	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
119	REGIST. STAFF	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
120	REGIST. STAFF	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	ALTERNATE 1
121	VESTIBULE	EXG.	EXG.	EXG.	EXG.	EXG.	EXG.	
122	HALL	EXG.	EXG.	EXG.	EXG.	EXG.	EXG.	
124	WOMENS RR	EXG.	TB - 1	EXG.	EXG.	EXG.	EP - 2	COVE BASE AND EPOXY PAINT ON SOUTH WALL; REFERENCE PLAN
124A	MOTHERS RM	EXG.	EXG. / TB - 2	EP - 2 / TW - 2	EP - 2 / TW - 2	EP - 2	EP - 2	REF. ELEVATION
131	RECORDS	EXG.	RB-1	EXG.	EXG.	EXG.	EXST	
135	EMERGENCY MGMT	EXG.	RB-1	PT - 1	PT - 1	PT - 1	PT - 1	
137	STAFF BREAK	VCT - 1	RB - 1	PT - 1	PT - 1	PT - 1	PT - 1	
144	ELECTION CENTRAL	EXG.	RB	PT - 1	PT - 1	PT - 1	PT - 1	
147	ADV. BOARD INCOMING MAIL / BALLOT COUNTING	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	
148	BALLOT TAB	EXG.	EXG.	PT - 1	PT - 1	PT - 1	PT - 1	
149	STAFF TRAINING	EXG.	RB-1	PT - 1	PT - 1	PT - 1	PT - 1	
150	EARLY VOTING	VCT - 1	RB - 1	PT - 1	PT - 1	PT - 1	PT - 1	
151	M RR	TF - 1	TB - 1	EP - 1 / TW - 1	EP - 1 / TW - 1	EP - 1/ TW - 1	EP - 1/ TW - 1	
152	W RR	TF - 1	TB - 1	PT - 1 / TW - 1	PT - 1 / TW - 1	PT - 1/ TW - 1	PT - 1/ TW - 1	
153	VOLUNTEER BREAK RM	VCT - 1	RB - 1	PT - 1	PT - 1	PT - 1	PT - 1	

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SEDGWICK COUNTY
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REMODEL
3639 N. Comotara St., Wichita, KS 67226

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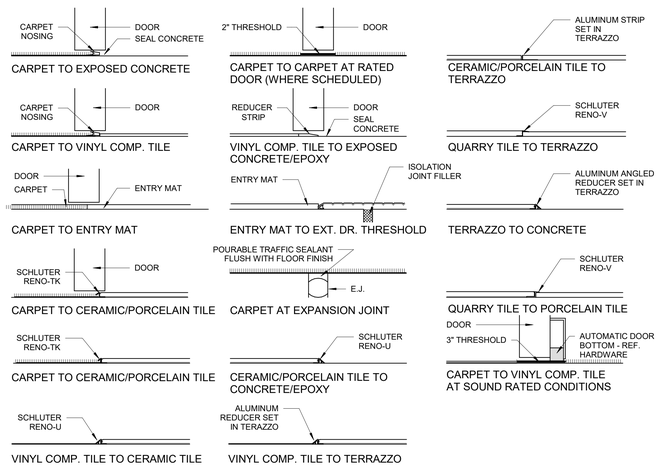
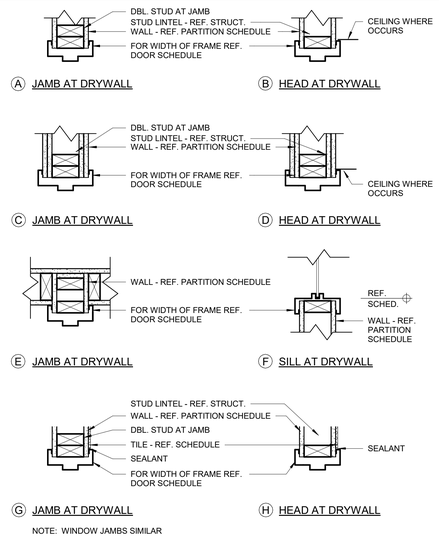
FINISH PLAN - AREA A

A28.1



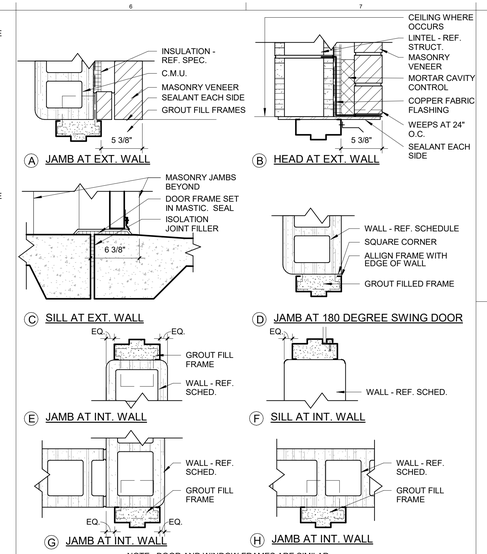
NOTE: NOT ALL CONDITIONS EXIST ON THIS PROJECT.

B1 FLOOR FINISH TRANSITIONS
1 1/2" = 1'-0"



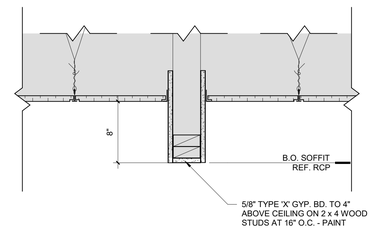
NOTE: WINDOW JAMBS SIMILAR

B4 TYP. HM METAL FRAME AT WOOD STUD
1 1/2" = 1'-0"

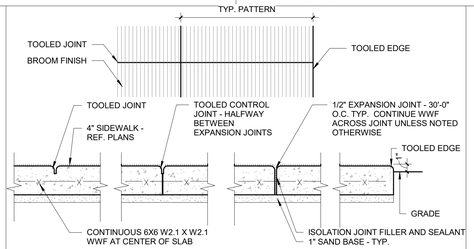


NOTE: DOOR AND WINDOW FRAMES ARE SIMILAR

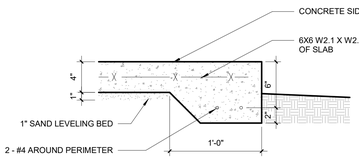
B6 TYP. HM FRAME AT MASONRY
1 1/2" = 1'-0"



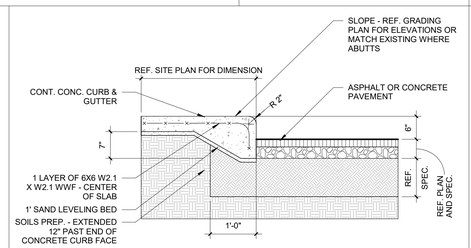
C1 SOFFIT
1 1/2" = 1'-0"



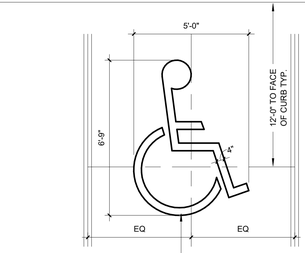
C3 CONCRETE SIDEWALK
1 1/2" = 1'-0"



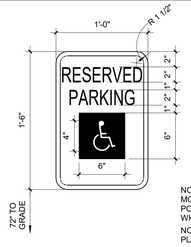
C5 THICKENED SIDEWALK EDGE
1 1/2" = 1'-0"



C7 CURB WITHOUT GUTTER
3/4" = 1'-0"



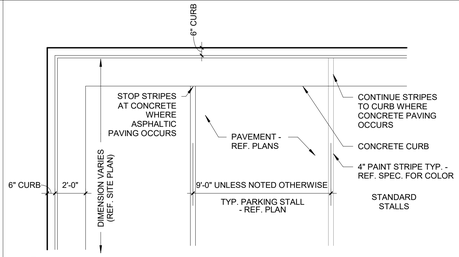
D1 HC PARKING STALL
3/8" = 1'-0"



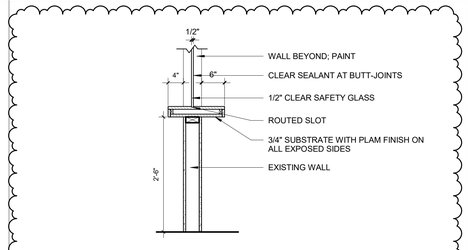
NOTE: MOUNT SIGN ON CENTER LINE OF PARKING STALL. MOUNT SIGN ON 1 1/2" DIA. STEEL POST. PRIME AND PAINT POST. SIGN SHALL BE BLACK LETTERING AND LINES ON WHITE BACKGROUND.

NOTE: "VAN ACCESSIBLE" SIGN WHERE INDICATED ON SITE PLAN

D3 HC PARKING SIGN
1 1/2" = 1'-0"



D5 TYP. PARKING STALL
1/4" = 1'-0"



D7 RECEPTION MILLWORK
3/4" = 1'-0"

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GENERAL DETAILS

A61.1

DOOR & FRAME SCHEDULE - EXISTING

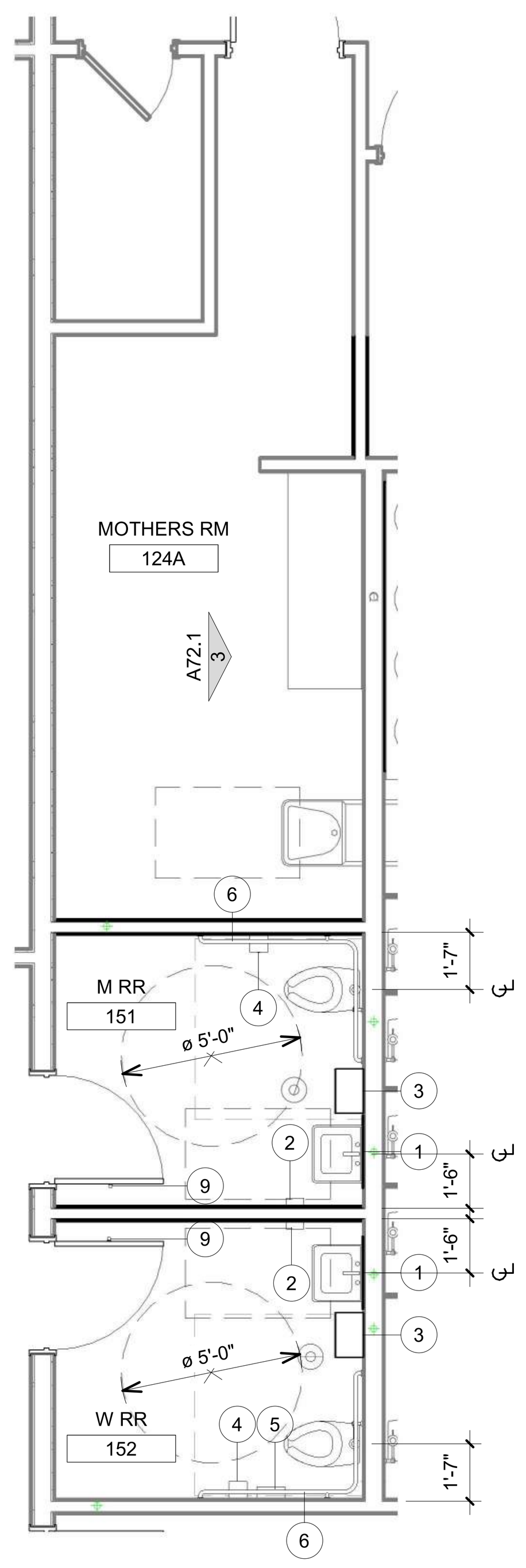
DOOR MARK	REMARKS
E101	ACCESS CONTROL
E102	ACCESS CONTROL
E103	ACCESS CONTROL
E104	--
E105	--
E106	--
E107	--
E108	--
E109A	--
E109B	
E110	--
E111	--
E112A	--
E112B	--
E113	--
E115A	--
E115B	--
E116	--
E117	--
E118	ACCESS CONTROL
E119	ACCESS CONTROL
E120	ACCESS CONTROL
E121	ACCESS CONTROL ; NEW HARDWARE - REF. SPEC.
E122A	ACCESS CONTROL
E122B	--
E123	--
E124A	NEW DOOR HARDWARE - REF. SPEC.
E124B	NEW DOOR HARDWARE - REF. SPEC.
E125	--
E126	--
E127A	--
E127B	--
E128	--
E129	ACCESS CONTROL
E131	ACCESS CONTROL
E132	--
E133A	--
E134	ACCESS CONTROL
E135	ACCESS CONTROL
E136A	ACCESS CONTROL
E136B	--
E138	ACCESS CONTROL
E139	ACCESS CONTROL
E140A	--
E140B	--
E140C	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140C	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140D	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140E	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140F	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140G	ACCESS CONTROL; PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140H	PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E140J	--
E140K	--
E141A	ACCESS CONTROL
E141B	--
E141C	--
E141D	--
E141E	--
E142A	--
E142B	--
E142C	--
E142D	
E143A	ACCESS CONTROL
E143B	--
E144	ACCESS CONTROL
E145	--
E146	--
E147A	--
E147B	--
E148	ACCESS CONTROL
E149	ACCESS CONTROL; PAINT INTERIOR SIDE
E149B	ACCESS CONTROL; PAINT INTERIOR SIDE
E150A	ACCESS CONTROL; PAINT EXTERIOR SIDE OF DOOR - MATCH EXISTING
E150B	ACCESS CONTROL; NEW INTERIOR AND EXTERIOR PUSH BUTTON OPENERs
S141	OWNER PROVIDED GATE - ACCESS CONTROL

DOOR & FRAME SCHEDULE

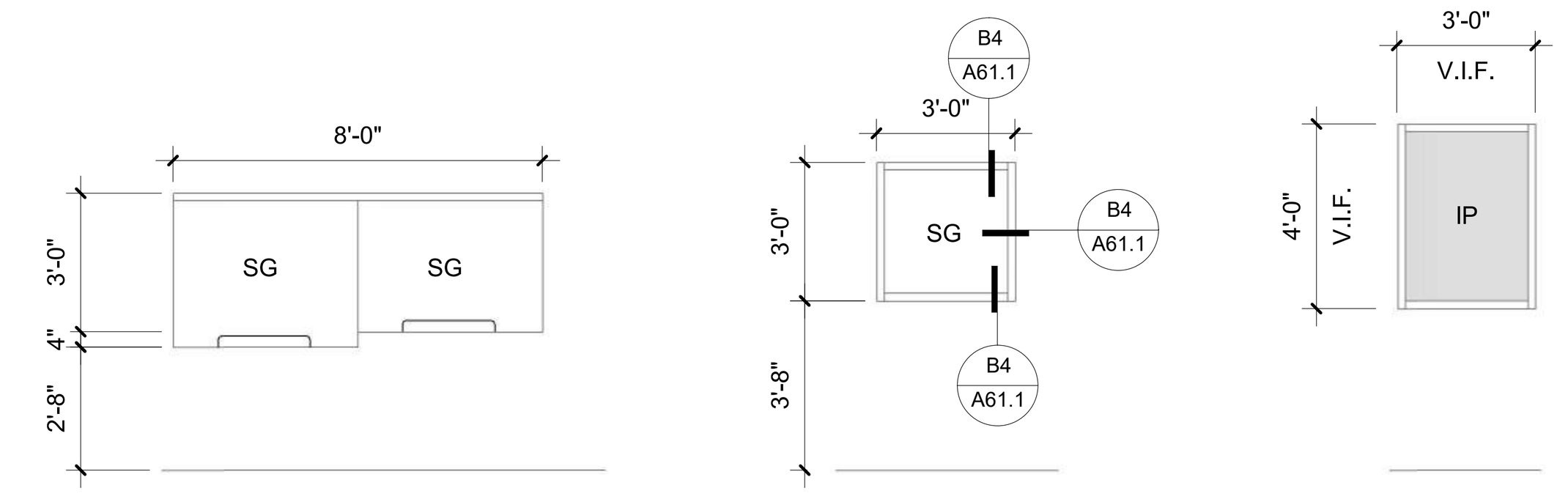
	DOOR						FRAME					DETAILS			
MARK	WIDTH	HEIGHT	MATERIAL	TYPE	GLASS	FIRE	DEPTH	MATERIAL	TYPE	GLASS	FIRE	JAMB	HEAD	SILL	REMARKS
133	6'-0"	7'-0"	HM	F	--	--	5 3/4"	HM	HM	--	--	A - B6/A61.1	B - B6/A61.1	C - B6/A61.1	PAINT
149A	3'-0"	6'-8"	WD	F	--	EXST.	5 5/8"	HM	HM	--	--	A - B4/A61/1	B - B4/A61.1	B1/A61.1	
151	3'-0"	6'-8"	WD	F	--	180 MIN.	8 7/8"	HM	HM	--	180 MIN.	G - B4/A61.1	H - B4/A61.1	B1/A61.1	
152	3'-0"	6'-8"	WD	F	--	180 MIN.	8 7/8"	HM	HM	--	180 MIN.	G - B4/A61.1	H - B4/A61.1	B1/A61.1	
153	3'-0"	6'-8"	WD	F	--	180 MIN.	8 7/8"	HM	HM	--	180 MIN.	G - B4/A61.1	H - B4/A61.1	B1/A61.1	
S111	3'-0"	6'-8"	WD	EXST.	EXST.	EXST.	5 5/8"	HM	HM	--	20 MIN.	A - B4/A61/1	B - B4/A61.1	B1/A61.1	
S124A	3'-0"	6'-8"	WD	EXST.	--	EXST.	5 5/8"	HM	HM	--	--	A - B4/A61/1	B - B4/A61.1	B1/A61.1	

WINDOW & FRAME SCHEDULE

	WINDOW				FRAME				DETAILS			
MARK	HEIGHT	WIDTH	MATERIAL	FIRE	DEPTH	MATERIAL	TYPE	FIRE	JAMB	HEAD	SILL	REMARKS
W1	3'-0"	8'-0"	SG	--								
W2	3'-0"	3'-0"	HM	--		HM		--				
W3	3'-0" V.I.F.	4'-0" V.I.F.	IP	--	EXST.	EXST.	EXST.	--	--	--	--	NEW INFILL PANEL IN EXISTING FRAME



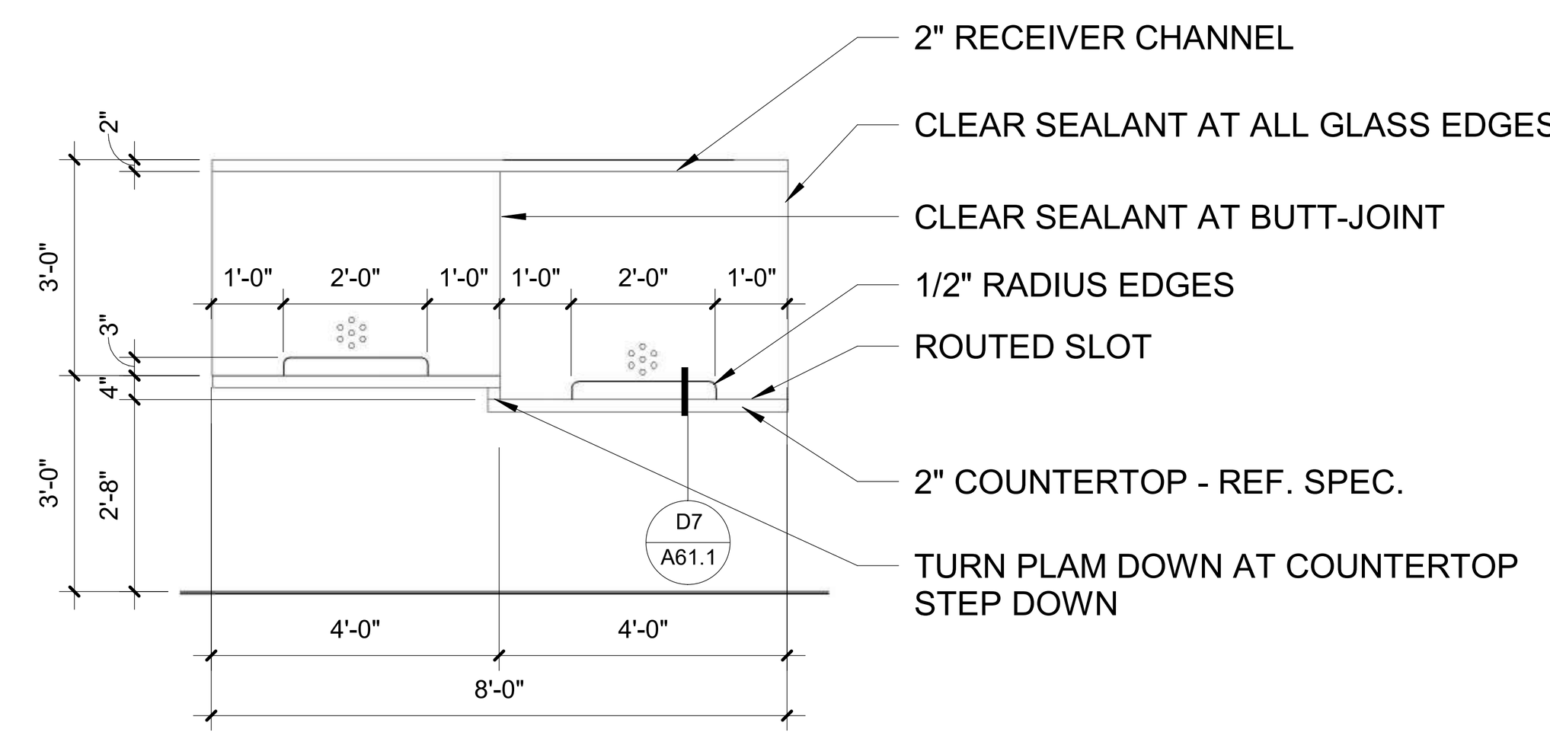
1 ENLARGED RESTROOMS - 151 & 152
1/4" = 1'-0"



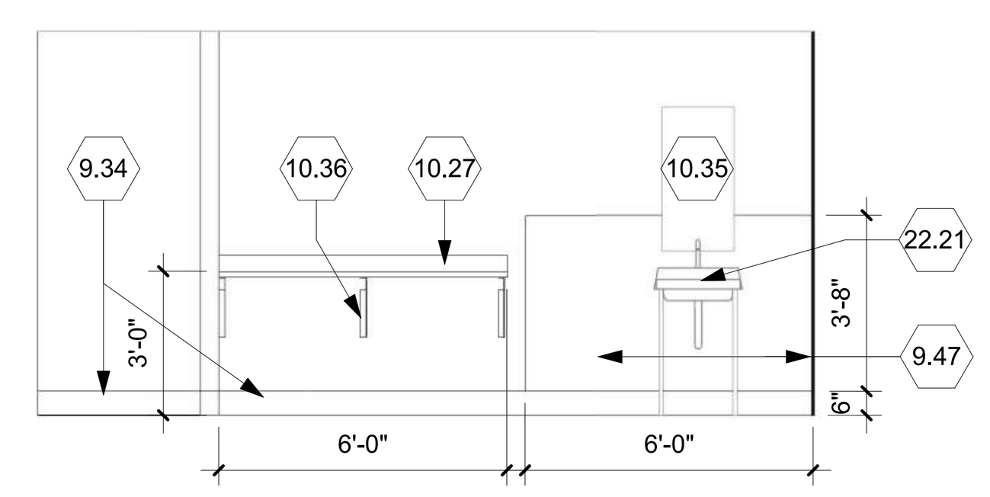
W1 W-01
1/4" = 1'-0"

W2 W-02
1/4" = 1'-0"

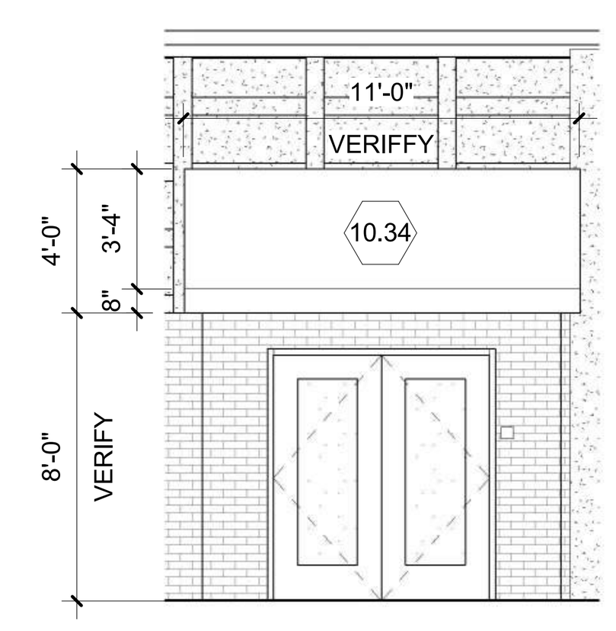
W3 W-03
1/4" = 1'-0"



2 RECEPTION MILLWORK
3/8" = 1'-0"



3 MOTHERS RM - 124A ELEVATION
1/4" = 1'-0"



4 AWNING ELEVATION
3/16" = 1'-0"

GENERAL NOTES

DOOR & FRAME MATERIAL:

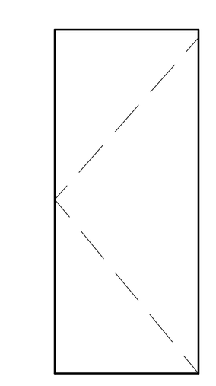
AL - ALUMINUM
HM - HOLLOW METAL
WD - WOOD
ST - STEEL
SS - STAINLESS STEEL
FRP - FIBERGLASS REINFORCED POLYMER

GLAZING MATERIAL:

IN - INSULATED
LM - LAMINATED
SG - SAFETY GLASS
W - WIRE GLASS
CLR - CLEAR GLASS
SP - SPANDREL GLASS
FR- 120 MIN RATED FIRE RESISTANCE GLASS MEETING UL 263
IP - INFILL PANEL

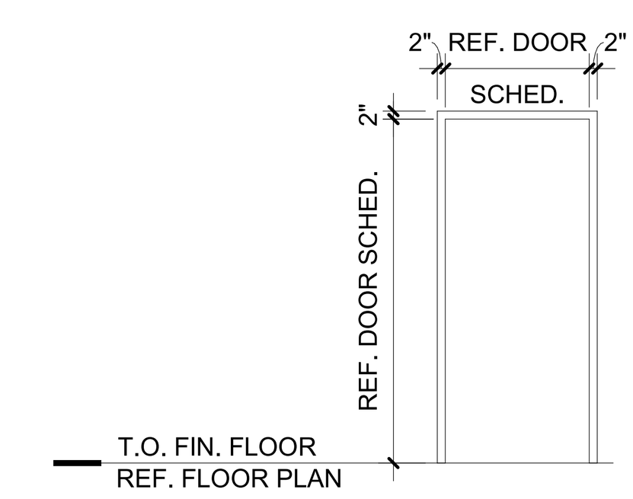
1. ALL DOORS ARE UNDERCUT AS SPECIFIED.
2. SAFETY GLAZING LISTED IS REQUIRED ONLY IN LOCATIONS TO MEET CODE REQUIREMENTS EXCEPT WHEN SHOWN IN REMARKS COLUMN OR DRAWINGS.
3. DOOR DIMENSIONS REFER TO OPENING DIMENSIONS OF FRAME.
4. WOOD DOORS TO BE FACTORY FINISHED UNLESS NOTED OTHERWISE - REF. SPEC.
5. HOLLOW METAL DOORS TO BE PAINTED UNLESS NOTED OTHERWISE - REF. SPEC
6. ALUMINUM DOORS, STOREFRONT AND CURTAIN WALL TO BE FACTORY FINISH UNLESS NOTED OTHERWISE - REF. SPEC
7. FURNISH AND INSTALL ALUMINUM STOREFRONT OR CURTAIN WALL FRAMES AND TRIM PER SPEC.
8. FIELD VERIFY ALL DIMENSIONS OF OPENINGS TO RECEIVE NEW STOREFRONT, CURTAIN WALL OR DOOR FRAMES PRIOR TO FABRICATION. SIZES SHOWN ARE FOR ESTIMATING PURPOSES AND DESIGN INTENT, ACTUAL CONDITIONS MAY VARY. ADJUST DIMENSIONS TO INCLUDE NECESSARY SHIMS, SEALANTS AND FLASHING. G.C. TO COMMUNICATE DIMENSIONAL DISCREPANCIES TO ARCHITECT PRIOR TO FABRICATION.
9. REPLACEMENT OF EXISTING WINDOW OR STOREFRONT:
   a. KEEP DUST TO A MINIMAL AND CLEAN UP AFTER WORK IN THAT AFFECTED AREA'S UPON COMPLETION.
   b. REPAIR ALL DAMAGED AREAS CAUSED BY WINDOW OR STOREFRONT REPLACEMENT INCLUDING (BUT NOT LIMITED TO) PLASTER OR GYP. BD. WALLS, WOOD TRIM, MILLWORK, CEILINGS, ETC. (VERIFY ALL EXISTING CONDITIONS PRIOR TO WORK).
   c. FIELD VERIFY ALL DIMENSIONS OF EXISTING OPENINGS TO RECEIVE NEW WINDOWS OR STOREFRONT PRIOR TO FABRICATION.
   d. CONTRACTOR SHALL REMOVE OLD UNITS AND INSTALL NEW WINDOW OR STOREFRONT UNITS IN THE SAME WORKING DAY.
10. REMOVE ALL SEALANT FROM EXISTING SURFACES AFTER EXISTING WINDOW IS REMOVED. PREP. AREA TO RECEIVE NEW WINDOW OR STOREFRONT.

DOOR TYPES



F

FRAME TYPES



HM

KEYNOTES

9.34	NEW TILE COVE BASE - REF. SCHEDULE AND SPEC.
9.47	NEW TILE WAINSCOT - REF. FINISH PLAN AND SPEC.
10.27	RELOCATED COUNTERTOP.
10.34	NEW PREFABRICATED FIXED FRAME AWNING WITH FABRIC OVER, ANCHOR TO VERTICAL CONRETE INTERMEDIATE SUPPORTS - REF. SPEC.
10.35	EXISTING MIRROR.
10.36	STEEL COUNTER SUPPORT, FIELD PAINT FINISH. 11 GA. STEEL, ALL CORNERS RADIUS WITH NO SHARP EDGES, PROVIDES KNEE CLEARANCE, UNDER COUNTER TOP. BRACKET LENGTH MUST BE APPROPRIATE TO SPECIFIED COUNTER DEPTH, PRE-DRILLED 1/4" MOUNTING HOLES. -REF. SPEC.
22.21	EXISTING WALL-MOUNTED SINK.

EQUIPMENT SCHEDULE NOTES

1. G.C. RESPONSIBLE FOR INSTALLING ALL WOOD BLOCKING IN STUD WALL AS REQUIRED FOR INSTALLING ALL ACCESSORIES (INCLUDING OWNER PROVIDED ITEMS)
2. ALL ACCESSORIES SHALL BE INSTALLED PER ADAAG REQUIREMENTS.
3. REFERENCE SPEC. FOR MANUFACTURER, MODEL NUMBERS, AND ADDITIONAL INFORMATION.
4. REFERENCE SHEET G14 ACCESSIBLITY CLEARANCES & MOUNTING HEIGHTS.

PARTITION SCHEDULE

	MATERIAL	GYPSUM BOARD						
TYPE MARK	OTHER	LOCATION OF GYP BOARD	TYPE	SOUND BATT INSULATION	FIRE RATING	UL #	TOP OF WALL	REMARKS
7C	2X4 WOOD STUD	ONE LAYER, BOTH SIDES	5/8" "X"	-	N.R.		8" ABOVE CEILING	
7C-1	2X4 WOOD STUD	ONE LAYER, BOTH SIDES	5/8" "X"	-	N.R.		8" ABOVE CEILING	
7D-1	2X4 WOOD STUD	ONE LAYER, BOTH SIDES	5/8" "X"	-	1-HR	U305	--	WALL INFILL

RESTROOM EQUIPMENT SCHEDULE

DESCRIPTION	NO.	MOUNTING HEIGHT	WIDTH	HEIGHT	DEPTH	MANUFACTURER	MODEL	REMARKS
WALL HUNG MIRROR	1	40" A.F.F. TO BOTTOM OF REFLECTIVE SURFACE	-	-	-	BY OWNER		
SOAP DISPENSER	2	6" ABOVE LAV.	-	-	-	BY OWNER		
PAPER TOWEL DISPENSER	3	48" A.F.F. TO TOP OF CONTROL	-	-	-	BY OWNER		
TOILET PAPER DISPENSER	4	19" A.F.F. TO CENTERLINE	-	-	-	BY OWNER		
SANITARY NAPKIN DISPOSAL	5	16" TO BOTTOM	11"	15 1/4"	4"	ASI	0475-1A	
GRAB BAR	6	33" A.F.F. TO CENTER				AMERICAN SPECIALTIES, INC.	#3257	
COAT HOOK	9	BACK SIDE OF DOOR; 48" MAX A.F.F.	-	-	-	BY OWNER	-	

RESILIENT BASE - RB

RB 1
MANUFACTURER: TARKETT
PRODUCT: 4"
COLOR: 72 HARBOUR
SIZE: -
INSTALLATION: -
LOCATION: TRANSITIONS AND BASE THROUGHOUT
NOTE: BASE BID

RB 2
MANUFACTURER: JOHNSONITE
PRODUCT: 4"
COLOR: 121 CEMENT
SIZE: -
INSTALLATION: -
LOCATION: TRANSITIONS AND BASE THROUGHOUT
NOTE: ALTERNATE 1

CARPET - CPT

CPT 1
MANUFACTURER: PATCRAFT
PRODUCT: BIG SPLASH I0166
COLOR: WASH 00314
SIZE: 24" X 24"
INSTALLATION: QUARTER-TURN
LOCATION: REF. SCHEDULE
NOTE: BASE BID

CPT 2
MANUFACTURER: MANNINGTON
PRODUCT: MULTIPLEXER
COLOR: RETROSCOPE 83638
SIZE: 24" X 24"
INSTALLATION: QUARTER-TURN
LOCATION: REF. SCHEDULE
NOTE: ALTERNATE 1; 5-WEEK LEAD TIME FROM P.O.

WOOD DOORS - D

D 1
MANUFACTURER: REF. SPEC.
PRODUCT: -
COLOR: RED OAK SERENGETI, SE18
SIZE: -
INSTALLATION: -
LOCATION: -

TILE GROUT - TG

TG 1
MANUFACTURER: TEC
PRODUCT: POWER GROUT
COLOR: 925 SABLE
SIZE: -
INSTALLATION: -
LOCATION: RESTROOM 151, 152

TG 2
MANUFACTURER: REF. SPEC.
PRODUCT: -
COLOR: TBD
SIZE: -
INSTALLATION: -
LOCATION: MOTHERS ROOM 124A

PAINT - P

P 1
MANUFACTURER: SHERWIN WILLIAMS
COLOR / NO.: SW 7037 BALANCED BEIGE
FINISH: EG-SHEL
LOCATION: FIELD

P 2
MANUFACTURER: SHERWIN WILLIAMS
COLOR / NO.: SW 7038 TONY TAUPE
FINISH: EG-SHEL
LOCATION: DOOR FRAMES

P 3
MANUFACTURER: SHERWIN WILLIAMS
COLOR / NO.: MATCH EXISTING PAINT
FINISH: MATCH EXISTING PAINT
LOCATION: -

EPOXY PAINT - EP

EP 1
MANUFACTURER: SHERWIN WILLIAMS
COLOR / NO.: SW 7037 BALANCED BEIGE
FINISH: EG-SHEL
LOCATION: RESTROOMS 151, 152

EP 2
MANUFACTURER: SHERWIN WILLIAMS
COLOR / NO.: MATCH EXISTING PAINT
FINISH: MATCH EXISTING
LOCATION: MOTHERS ROOM 124A

PLASTICE LAMINATE - PL

PL 1
MANUFACTURER: WILSONART
PRODUCT: 4944-38
COLOR: CASUAL LINEN
SIZE:
INSTALLATION:
LOCATION: RECEPTION COUNTER

PL 2
MANUFACTURER: FORMICA
PRODUCT: 9240-58
COLOR: CHERRY HEARTWOOD
SIZE:
INSTALLATION:
LOCATION: EXISTING BASE CABINETS

PL 3
MANUFACTURER: FORMICA
PRODUCT: 6220-58
COLOR: SMOKE QUARSTONE
SIZE:
INSTALLATION:
LOCATION: EXISTING COUNTERTOPS

TILE FLOOR - TF

TF 1
MANUFACTURER: CROSSVILLE
PRODUCT: NOTORIOUS UNPOLISHED
COLOR: PRIVATE EYE
SIZE: 12" X 12"
INSTALLATION: STACKED
LOCATION: NEW RESTROOM 151, 152

VINYL COMPOSITION TILE - VT

FAF 1
MANUFACTURER: REF. SPEC.
PRODUCT: IMPERIAL TEXTURE
COLOR: 51803 PEARL WHITE
SIZE: 12" X 12"
INSTALLATION: -
LOCATION: REF. FINISH PLAN

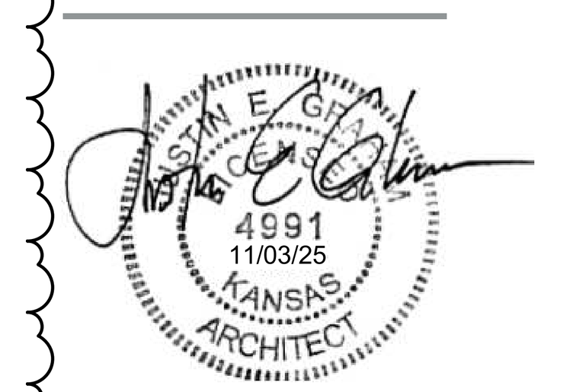
TILE WALL - TW

TW 1
MANUFACTURER: CROSSVILLE
PRODUCT: NOTORIOUS UNPOLISHED
COLOR: PRIVATE EYE
SIZE: 12" X 12"
INSTALLATION: 4'-0" A.F.F. W/ SCHULTER EDGE & COVE BASE STACKED
LOCATION: NEW RESTROOM 151, 152

TW 1
MANUFACTURER: AMERICAN OLEAN
PRODUCT: COLOR STORY WALL
COLOR: MATTE CALM 0036
SIZE: 4" X 4"
INSTALLATION: 4'-0" A.F.F. W/ SCHULTER EDGE, STACKED
LOCATION: MOTHERS ROOM 124A - REF. FINISH PLAN

TILE BASE - TB

TB 1
MANUFACTURER: AMERICAN OLEAN
PRODUCT: COLOR STORY WALL
COLOR: MATTE CALM 0036
SIZE: 6" X 6" COVE BASE A3601
INSTALLATION: -
LOCATION: RM 124 & 124A



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MIDWEST ENGINEERING, INC.
INTEGRATED CONSULTING ENGINEERS, P.A.

SEDGWICK COUNTY
ELECTIONS AND RECORDS MANAGEMENT REMODEL
3639 N. Comotara St., Wichita, KS 67226

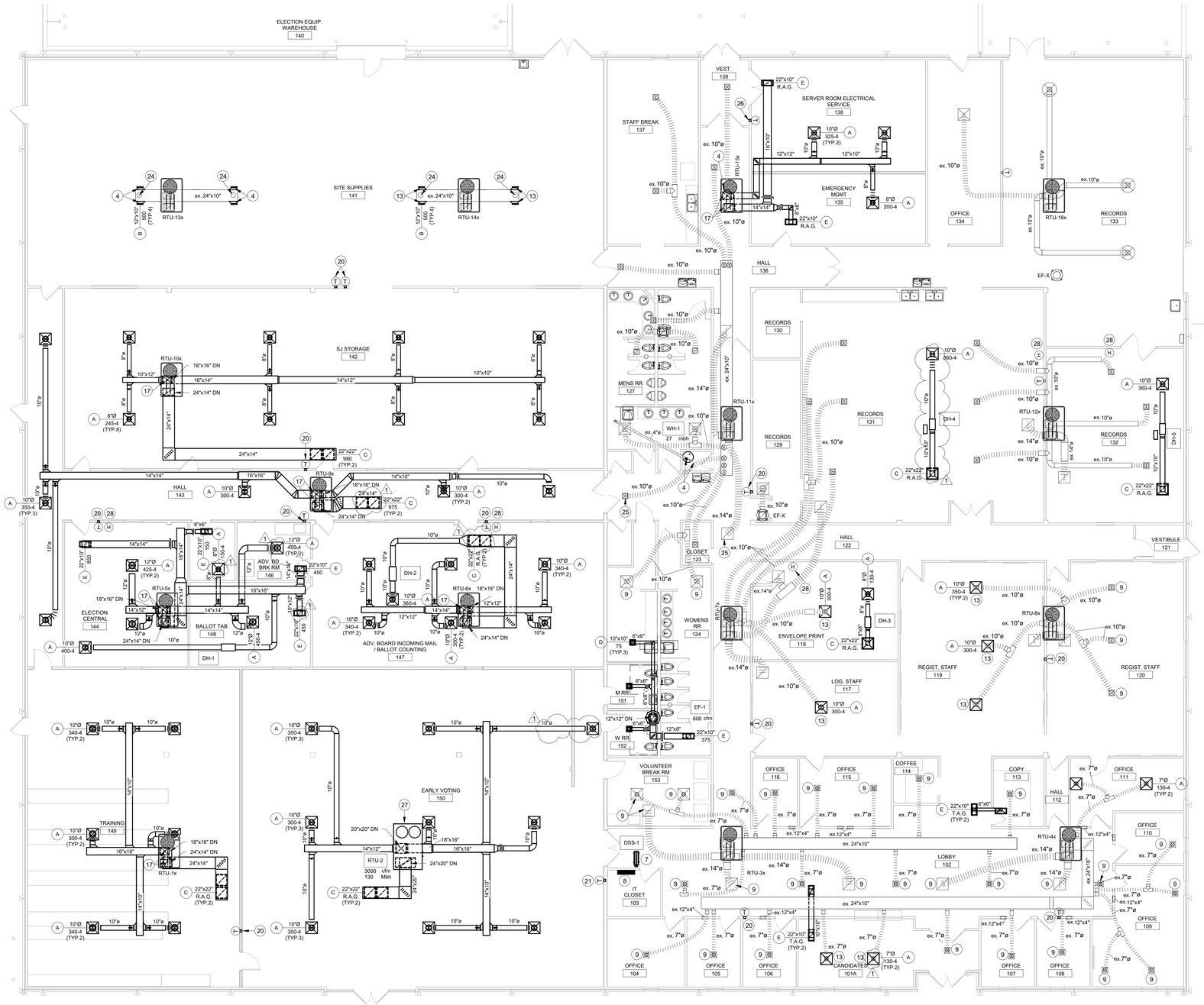
REVISIONS
1 AD 1 11.03.2025

PROJECT NUMBER
5278.57

DATE
10.17.25

DOOR & FRAME SCHEDULE

A72.1



1 HVAC Plan
1/8" = 1'-0"

PLAN NOTES

4 CONNECT TO EXISTING. FIELD VERIFY SIZE.
7 INSTALL NEW OUTDOOR CONDENSING UNIT ON ROOF. PROVIDE EQUIPMENT STAND.
8 MOUNT TOP OF INDOOR UNIT 8" MIN. BELOW CEILING.
9 EXISTING DIFFUSER/GRILLE TO REMAIN.
13 CONNECT NEW DIFFUSER TO EXISTING DUCTWORK.
17 CONNECT NEW DUCTWORK TO EXISTING RTU DROPS.
20 PROVIDE NEW THERMOSTAT, EQUAL TO HONEYWELL T5 7-DAY PROGRAMABLE THERMOSTAT AND PROVIDE A LOCKABLE COVER.
21 PROVIDE NEW THERMOSTAT, EQUAL TO ACI A/CP-RSO AND PROVIDE A LOCKABLE COVER
24 CAP EXISTING DUCT TAKE-OFF.
25 THE EXISTING RUNOUT TO THE GRILLE/DIFFUSER HAS A 1 HR FIRE DAMPER AT THE GYP. SUB-CEILING. PROVIDE A SMOKE DAMPER, 120V, IN THE DUCT ABOVE THE GYP. CEILING IN THE RUNOUT WITHIN 12" OF THE FIRE DAMPER. MAINTAIN ADEQUATE DISTANCE FROM THE RADIANT DAMPER FOR PROPER OPERATION.
26 RELOCATE EXISTING THERMOSTAT FOR RTU-15.
27 NEW RTU TO BE PLACE IN SAME LOCATION AS EXISTING RTU. PROVIDE ADDITIONAL STEEL FRAMING AS REQUIRED FOR UNIT.
28 PROVIDE MANUFACTURER HUMIDISTAT FOR ROOM.

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BRADLEY LEON WARD
LICENSED
14703
11/03/25
KANSAS
PROFESSIONAL ENGINEER

SEDWICK CO. ELECTIONS BUILDING
ELECTIONS AND RECORDS MANAGEMENT
REMODEL

3839 N. COMOTARA ST.
WICHITA, KS 67226

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HVAC Plan

M22.1

1 Plumbing Plan Demo
1/8" = 1'-0"

PLAN NOTES

6 REMOVE EXISTING WATER HEATER AND DISCONNECT PIPING.
11 REMOVE EXISTING PLUMBING FIXTURE AND ASSOCIATED PIPING.
14 REMOVE EXISTING PIPING.
15 CAP SANITARY PIPING BELOW FLOOR AND PATCH TO MATCH EXISTING.
18 REMOVE EXISTING RTU. REMOVE ASSOCIATED DUCTWORK. DISCONNECT POWER. DISCONNECT GAS PIPING. CAP PIPING FOR THE SHORT TERM AND PREP FOR CONNECTION TO NEW UNIT.
30 REMOVE EXISTING PLUMBING FIXTURE AND ASSOCIATED PIPING AND CAP PIPING IN FLOOR OR WALL.
31 REMOVE EXISTING FAUCET.

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Plumbing Demo Plan

M31.1

PLAN NOTES

4 CONNECT TO EXISTING. FIELD VERIFY SIZE.
10 REFRIGERANT PIPING TO BE INSTALLED AND SIZED PER UNIT MFG'S REQUIREMENTS. ROUTE THROUGH ROOF CURB TO UNIT.
16 CONNECT NEW WATER HEATER TO EXISTING PIPING AND FLUE.
19 CONNECT NEW FIXTURE TO EXISTING SANITARY PIPING.
22 GAS COMPANY TO ADJUST CAPACITY TO 1557 CFH.
29 INSTALL ICE MAKER BOX BELOW COUNTER HEIGHT.

1 Plumbing Plan
1/8" = 1'-0"

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DATE
10.16.25

Plumbing Plan

M32.2

DIFFUSERS/GRILLES/REGISTERS

MARK	MFR.	MODEL	FACE SIZE	MOUNTING	BORDER	SERVICE	MATERIAL	FINISH	ACCESSORIES	NOTES
A	TITUS	TMSA	24"x24"	LAY-IN	3	SUPPLY	STEEL	WHITE	--	1,2,3
B	TITUS	1707	SEE PLANS	SURFACE	1	SUPPLY	ALUMINUM	WHITE	1,3	1,3
C	TITUS	50R	24"x24"	LAY-IN	1	RET/EXH	ALUMINUM	WHITE	1,3,4	1,2,3
D	TITUS	50R	12"x12"	LAY-IN	1	RET/EXH	ALUMINUM	WHITE	1,3,4	1,2,3
E	TITUS	50R	24"x12"	LAY-IN	1	RET/EXH	ALUMINUM	WHITE	1,3,4	1,2,3

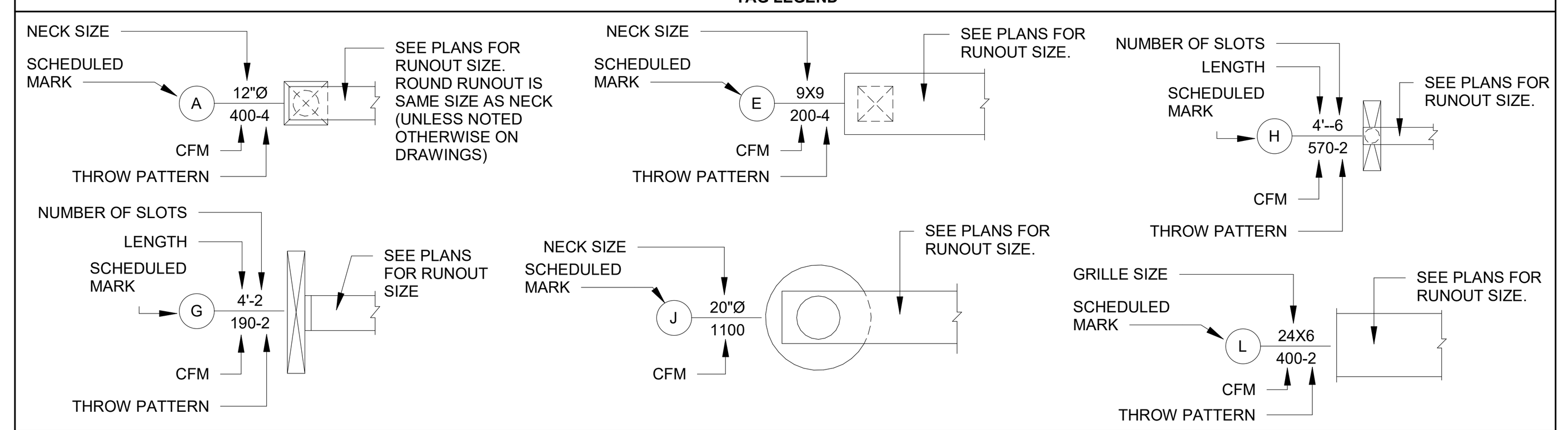
ACCESSORIES

1. OPPOSED BLADE DAMPER
2. FIRE RADIATION DAMPER & INSULATION BLANKET
3. BLADES TO BE IN THE HORIZONTAL PLANE
4. 1/2"x1/2"x1/2" CORE
5. FILTER
6. (2) TYPE X END BORDERS
7. CONCEALED FASTENERS
8. CENTER T-BAR
9. RETAINER CABLE

NOTES

1. SEE CALLOUTS ON PLANS FOR NECK SIZE, CFM, AND THROW PATTERN
2. MECHANICAL CONTRACTOR SHALL PROVIDE REQUIRED ADAPTERS/TRANSITIONS AT ALL GRD CONNECTIONS
3. ALL INTERIOR DUCT SURFACES VISIBLE THRU FACE OF GRILLE/DIFFUSER SHALL BE PAINTED FLAT BLACK (BY M.C.)
4. GRDS SCHEDULED AS PRIMED FINISH SHALL BE FIELD PAINTED BY G.C.

TAG LEGEND



PLUMBING FIXTURES

MARK	FIXTURE TYPE	MFR.	MODEL	DESCRIPTION	MATERIAL	FAUCET/VALVE	ACCESSORIES	INSTALLATION HEIGHT (SEE NOTTES BELOW)
P-1	WATER CLOSET	KOHLER	K-96057	FLOOR MOUNT	VITREOUS CHINA	SLOAN G2 8111-1.6	4,5	--
P-2	LAVATORY	KOHLER	K-2005	WALL MOUNT	VITREOUS CHINA	ZURN Z6956-XL-W1	1,3,7b,16	6
P-3	DRAIN BOX	GUY GRAY	T200TPPLV	WALL MOUNT	STANLESS STEEL	--	--	--
P-4	FAUCET	ZURN	Z6956-XL-W1	COUNTER MOUNT	STANLESS STEEL	--	16	--
P-5	ICE MAKER BOX	GUY GRAY	SSIB1AB	WALL MOUNT	STANLESS STEEL	--	--	--

GENERAL ACCESSORY NOTES (ALL FIXTURES AS APPLICABLE)

1. CARRIERS SHALL BE PROVIDED FOR ALL WALL HUNG WATER CLOSETS, URINALS, & LAVATORIES.
2. ALL ADA SINKS SHALL BE FURNISHED WITH REAR CENTERED DRAIN OPENINGS.
3. ALL ADA LAVATORIES & SINKS NOT PROTECTED BY AN ARCHITECTUAL SKIRT PANEL SHALL BE FURNISHED WITH UNDERSINK PIPING COVERS EQUAL TO TRUEBRO LAVAGARD 2.
4. ALL ADA WATER CLOSETS & URINALS SHALL BE FURNISHED WITH THE FLUSH LEVER ON THE WIDE SIDE OF THE FIXTURE. SEE PLANS.
5. UNLESS OTHERWISE NOTED, ALL WATER CLOSETS SHALL BE FURNISHED WITH WHITE OPEN FRONT SEATS, LESS COVERS.
6. UNLESS OTHERWISE NOTED, PIPING CONNECTION SIZES OF ALL FLOOR DRAINS, FLOOR SINKS, & CLEANOUTS SHALL MATCH PIPING RUNOUT SIZE SHOWN ON PLANS.
7. STRAINERS:
   a. GRID
   b. POP UP
   c. BASKET
8. STAINLESS STEEL DRAIN BODY, VINYL BUMPER GUARDS, 24" MOP BRACKET, STAINLESS STEEL WALL GUARDS, 30" HOSE & BRACKET.
9. PROVIDE PRO-SET TRAP GUARD ON ALL FLOOR DRAINS.
10. THREE COMPARTMENT TO BE PUNCHED FOR TWO (2) FAUCETS AND THREE (3) J35-BAL-2 TWIST HANDLE DRAINS.
11. INSINKERATOR BADGER 5, 1/2 HP DISPOSER.
12. PROVIDE BOX LESS VALVES AND ACCESS COVER.
13. M.C. TO PROVIDE FINAL CONNECTIONS.
14. PROVIDE 2 EXTRA BOTTLES PER SINK.
15. PROVIDE LID EXTENSIONS AS NEEDED TO GRADE.
16. ASSE 1070 THERMOSTATIC MIXING VALVE ON ALL LAVATORIES & SINKS.

INSTALLATION

INSTALLATION HEIGHTS:

1. TOP OF RIM = 15" A.F.F. (ADA RIM = 17" A.F.F. (TOP OF SEAT = 18" - 19" A.F.F.). FLUSH CONTROL ON WIDE SET OF FIXTURES AT MAX. 36" A.F.F. ON FIXTURES WITH A ' ')
2. TOP OF RIM = 17" A.F.F.
3. TOP OF FRONT OF RIM = 24" A.F.F. (ADA - 17" A.F.F. FLUSH CONTROL ON WIDE SIDE OF FIXTURE AT MAX. 44" A.F.F., INDICATED WITH AN ' ')
4. FIXED SHOWER HEAD HEIGHT MEN 78" A.F.F., WOMEN 72" A.F.F., CHILD 48" @ CENTER OF VALVE, ADA FIXED SHOWER HEAD HEIGHT 72" A.F.F.
5. TOP OF FRONT OF RIM = 24" A.F.F.
6. TOP OF RIM = 32" A.F.F. (ADA - 34" A.F.F.)
7. HIGH SPOUT = 42" A.F.F., LOW SPOUT = 36" A.F.F.

CHILD:

8. TOP OF RIM = 14" A.F.F. (ADA RIM = 14" A.F.F. (TOP OF SEAT = 15" - 16" A.F.F.) FLUSH CONTROL ON WIDE SIDE OF FIXTURE AT MAX. 36" A.F.F., ON FIXTURES WITH A ' ') (AGES 12 - DOWN)
9. TOP OF FRONT OF RIM = 20" (ADA RIM = 17" A.F.F. FLUSH CONTROL ON WIDE SIDE OF FIXTURE AT MAX. 42" A.F.F., ON FIXTURES WITH A ' ') (AGES 12 - DOWN)
10. TOP OF RIM = 30" A.F.F. (ADA RIM 34" ON FIXTURES WITH A ' ') (AGES 6 -12)
11. TOP OF RIM = 26" A.F.F. (PRE-K ADA)
12. 27" TO BUBBLER.

ROUGH-IN SIZES

ROUGH-IN SIZES:

UNLESS OTHERWISE NOTED IN REMARKS SECTION, FIXTURE ROUGH-IN & CONNECTION PIPING SIZES SHALL BE AS FOLLOWS:

FIXTURE	TRAP	WASTE	VENT	CW	HW
WATER CLOSET-FLUSH TANK	--	4"	2"	1/2"	--
WATER CLOSET-FLUSH VALVE	--	4"	2"	1 1/4"	--
URINAL-FLUSH VALVE	--	2"	1 1/2"	3/4"	--
LAVATORY	1 1/2"	2"	1 1/2"	1/2"	1/2"
BATHTUB/SHOWER	1 1/2"	2"	1 1/2"	1/2"	1/2"
SINK-HAND BAR, RESIDENTIAL KIT	1 1/2"	2"	1 1/2"	1/2"	1/2"
SINK-COMMERCIAL KITCHEN	2"	2"	1 1/2"	3/4"	3/4"
RESIDENTIAL CLOTHES WASHER BOX	2"	2"	1 1/2"	3/4"	3/4"
ICE MAKER/ICE MAKER BOX	--	--	--	1/2"	--
MOP BASIN/SERVICE SINK	3"	3"	2"	3/4"	3/4"
WALL HYDRANT/HOSE BIBB	--	--	--	3/4"	--
DRINK FTN/ELEC WTR COOLER	1 1/2"	2"	1 1/2"	1/2"	--

SEE PLANS FOR PIPING SIZES TO FIXTURES NOT LISTED. REFERENCE PLAN WITH ( ) FOR ADA FIXTURES.

WATER HEATERS

MARK	MFR.	MODEL	STORAGE CAPACITY (GAL.)	REC. RATE (GHP.)	WATER TEMP. RISE (°F)	GAS INPUT (MBH)	VENTING (SEE NOTES BELOW)	IGNITION TYPE (SEE NOTES BELOW)	NOTES (SEE BELOW)	ELECTRICAL VOLTAGE	ELECTRICAL FLA
WH-1	BRADFORD WHITE	RG130T6N	30	29	90	27	1	1	1,3	--	--

VENTING

1. CATEGORY IV VENT.
2. CLOSED COMBUSTION - PVC VENT/INTAKE PIPING; SEE PLANS FOR PIPE SIZES.
3. PROVIDE WITH CONCENTRIC DIRECT VENT.

IGNITION TYPES

1. STANDING PILOT.
2. INTERMITTENT SPARK.
3. HOT SURFACE IGNITER.

NOTES

1. SET TO PROVIDE 120°F HOT WATER.
2. SET TO PROVIDE 140°F HOT WATER.
3. ASME RATED.

DEHUMIDIFIERS

MARK	MFR.	MODEL	CAPACITY (PINTS/D)	DUCT SIZE (EA.)	FLA	KW	VOLTAGE	NOTES
DH-1	SANTA FE	ULTRA V155	128	10	10	0.81	115/1/60	2,3
DH-2	SANTA FE	ULTRA V155	128	10	10	0.81	115/1/60	2,3
DH-3	SANTA FE	ULTRA70	55	8	5.1	0.58	115/1/60	1,2
DH-4	SANTA FE	ULTRA V155	128	10	10	0.81	115/1/60	2,3
DH-5	SANTA FE	ULTRA V155	128	10	10	0.81	115/1/60	2,3

NOTES

1. PROVIDE WITH MANUFACTERER SMALL HANGING KIT.
2. PROVIDE WITH MANUFACTERER MEDIUM HANGING KIT.
3. HUMIDSTAT PROVIDED BY UNIT MANUFACTURER

GAS LOAD

SEDGWICK COUNTY ELECTIONS BUILDING

RTU-1x	100 MBH	7" W.C.
RTU-2	130 MBH	7" W.C.
RTU-3x	100 MBH	7" W.C.
RTU-4x	100 MBH	7" W.C.
RTU-5x	100 MBH	7" W.C.
RTU-6x	100 MBH	7" W.C.
RTU-7x	100 MBH	7" W.C.
RTU-8x	100 MBH	7" W.C.
RTU-9x	100 MBH	7" W.C.
RTU-10x	100 MBH	7" W.C.
RTU-11x	100 MBH	7" W.C.
RTU-12x	100 MBH	7" W.C.
RTU-13x	100 MBH	7" W.C.
RTU-14x	100 MBH	7" W.C.
RTU-15x	100 MBH	7" W.C.
WH-1	27 MBH	7" W.C.
TOTAL	1,557 MBH	7" W.C.

MAX DISTANCE: 350FT

PACKAGED ROOFTOP UNITS

GENERAL DATA / AIR FLOW DATA

MARK	MFG.	MODEL	FAN DRIVE	UNIT WEIGHT	ACCESSORIES (SEE BELOW)	NOTES (SEE BELOW)	CONFIG	SUPPLY FAN ESP (IN.)	SUPPLY FAN AIR FLOW (CFM)	EXHAUST FAN ESP (IN.)	EXHAUST FAN AIR FLOW (CFM)	MINIMUM OUTSIDE AIR FLOW (CFM)
RTU-2	DAIKIN	DHG1024LL	DIRECT	1268	6a,7,12,13	3	VERTICAL	1.07	3000	--	--	576

COOLING DATA / GAS HEATING DATA

MARK	NOMINAL CAPACITY (TONS)	# STAGES	EER @ ARI (HI STAGE)	MINIMUM NET TOTAL CAPACITY (MBH) (HI STAGE)	MINIMUM NET SENSIBLE CAPACITY (MBH) (HI STAGE)	CONDENSER AMBIENT TEMP. (°F)	UNIT EDB/EWB (°F)	UNIT LDB/LWB (°F)	# STAGES	INPUT (HIGH) (MBH)	OUTPUT (HIGH) (MBH)	EDB/LDB (°F) (HIGH STAGE)
RTU-2	7.5	2	17.5	96.0	76.5	105	82.5/66.3	58.1/55.3	2	130	105.3	51.0/84.7

DEHUMIDIFICATION DATA / SOUND DATA — DISCHARGE/RADIATED (DB)

MARK	REHEAT CAPACITY (MBH)	LAT WBI(°F)	COIL AREA	APD	63	125	250	500	1 K	2 K	4 K	8 K
RTU-2	--	--	--	--	N/A	70.3	70.6	75.1	76.4	74.4	69.1	60.1

ELECTRICAL DATA

MARK	VOLTAGE	MCA	MOP	SUPPLY FAN HP	SUPPLY FAN FLA (EA.)	EXHAUST FAN(s) #	EXHAUST FAN(s) HP	EXHAUST FAN(s) FLA (EA.)	CONDENSER FAN(s) #	CONDENSER FAN(s) HP	CONDENSER FAN(s) FLA (EA.)	COMPRESSOR(s) #	COMPRESSOR(s) RLA (EA.)
RTU-2	460/3/60	23.3	30.0	3.5	7.2	--	--	--	2	--	1.7	2	12.8

ACCESSORIES

FURNISHED WITH UNIT (FACTORY INSTALLED WHERE POSSIBLE):

ALL UNITS:

1. 14" HIGH PERMANUFACTURED ROOF CURB SLOPED TO MATCH ROOF FOR LEVEL RTU INSTALLATION.
2. CONDENSER COIL HAIL GUARDS.
3. SINGLE POINT ELECTRICAL CONNECTION.
4. HINGED ACCESS DOORS
5. 2 SETS OF 2", MERV 7 PLEATED FILTERS.

ADDITIONAL ACCESSORIES (AS NOTED):

6. FULL ECONOMIZER CAPABILITY (COMPARATIVE ENTHALPY SENSING), INCLUDING ALL REQUIRED ASSOCIATED CONTROLS, PLUS:
   a. BAROMETRIC RELIEF
   b. POWERED RELIEF
7. HOT GAS REHEAT TO BE FACTORY INSTALLED.
8. HOT GAS BYPASS TO BE FACTORY INSTALLED.
9. BACNET MSTP, SPACE T-STAT & DUCT HUMIDISTAT.
10. SINGLE ZONE VAV WITH VFD'S OR ECM'S (SUPPLY AND EXHAUST FANS) BY UNIT MANUFACTURER.
11. VARIABLE SPEED COMPRESSOR.
12. 2 SPEED FAN AND 2 STAGE COMPRESSORS.
13. PROVIDE 7-DAY PROGRAMABLE THERMOSTAT WITH LOCKABLE COVER.

ACCESSORIES (CONT.)

FURNISHED BY OTHERS:

ALL UNITS:

14. ELECTRIC DISCONNECTS, 120 VOLT GFCI CONVENIENCE OUTLETS, & SMOKE DETECTORS (AS REQUIRED) BY E.C..

NOTES

GENERAL:

1. SCHEDULED CAPACITIES ARE BASED ON THE FOLLOWING DESIGN CONDITIONS:

   SUMMER: 101°F DB/73°F WB
   CONDENSER AMBIENT: 105°F
   WINTER: 0°F

2. T.C.C. SHALL PERFORM ALL LOW VOLTAGE INTERLOCK WIRING.

UNIT-SPECIFIC NOTES:

3. SELECTION IS BASED ON STANDARD EFFICIENCY EQUIPMENT.
4. SELECTION IS BASED ON HIGH EFFICIENCY EQUIPMENT.

SPLIT HVAC SYSTEM

GENERAL DATA / INDOOR UNIT

MARK	MFR.	TOTAL COOLING CAPACITY (MBH)	HEAT PUMP HEATING CAPACITY (MBH)	ELECTRIC HEAT CAPACITY (KW)	ACCESSORIES (SEE BELOW)	AIR FLOW (CFM)	OUTSIDE AIR FLOW (CFM)	MCA	MCB	ELECTRICAL VOLTAGE	ELECT. HEAT KW	FAN RLA	OPER. WEIGHT (LBS.)	MODEL
DSS-1	LG	12	12	--	1 - 6	353	0	--	--	208/1	--	1	20	LSN120HEV2

OUTDOOR UNIT / ELECTRICAL / REFRIGERANT PIPING

MARK	OUT MODEL	CONDENSER AMBIENT TEMP. (°F)	VOLTAGE	COND. FAN HP	COND. FAN FLA (EA.)	COMP. RLA	OUT OPER WEIGHT (LBS)	OUT TOTAL UNIT AMPS	OUT MCA	OUT MOP	OUT LIQUID LINE O.D. (IN.)	OUT SUCTION LINE O.D. (IN.)
DSS-1	LSU120HEV2	95	208/1	--	.4	7	56	7.8	10	15	PER MFG.	PER MFG.

ACCESSORIES

FURNISHED WITH UNIT (FACTORY INSTALLED WHERE POSSIBLE):

1. LOW AMBIENT (0°F) COOLING CAPACITY.
2. OUTDOOR UNIT HARD START KIT.
3. COMPESSOR ANTI-SHORT CYCLE PROTECTION.
4. SYSTEM SHALL BE FACTORY WIRED AND SHALL INCLUDE TRANSFORMER, CONTROL RELAY, ETC. FOR 24 VOLT CONTROL VOLTAGE AND WIRING CONNECTION TERMINALS FOR LOW VOLTAGE INTERLOCKING.

ACCESSORIES (CONT.)

FURNISHED BY M.C.:

5. FOR EACH SYSTEM PROVIDE, A 5-1-1 DAY DIGITAL, PROGAMMABLE THERMOSTAT COMPATIBLE WITH UNIT.

FURNISHED BY OTHERS:

6. ELECTRIC DISCONNECTS BY E.C..

NOTES

FANS

MARK	MFR.	MODEL	TYPE	CFM	ESP (IN.)	AIR TEMP. (°F)	MAX. LWA	FAN DRIVE	FAN RPM	MOTOR HP/(MAX.WATTS)	VOLTAGE	SHIPPING WEIGHT (LBS.)	CONTROL TYPE (SEE NOTES BELOW)	ACCESSORIES (SEE NOTES BELOW)
EF-1	COOK	101C15D	I	600	.5	70	69	DIRECT	1514	1/8	115/1	49	3	1,2,3

ACCESSORIES

FURNISHED WITH UNIT (FACTORY INSTALLED WHERE POSSIBLE):

1. EACH UNIT SHALL BE FURNISHED WITH A 14" HIGH PREMANUFACTURED ROOF CURB SLOPED TO MATCH ROOF FOR LEVEL FAN INSTALLATION.
2. ALL DIRECT DRIVE FANS SHALL BE FURNISHED WITH SPEED CONTROLLERS.
3. ELECTRIC DISCONNECT.
4. METAL CEILING GRILLE.
5. MOTORIZED BACKDRAFT DAMPER.
6. VIBRATION ISOLATORS WITH MOUNTING RAILS
7. MODEL XXX ROOF JACK.
8. BIRD SCREEN.
9. FIRE RADIATION DAMPER.
10. FURNISHED WITH VENTED CURB EXTENSION, HINGED BASE KIT, GREASE TROUGH. UNIT SHALL CARRY UL-762 LISTING FOR GREASE EXHAUST.
11. SPARK RESISTANT MOTOR.

FAN CONTROL TYPES

1. PILOT WALL SWITCH.
2. SWITCH WITH LIGHTS.
3. TIME CLOCK.
4. THERMOSTAT.
5. CONTINUOUS OPERATION.
6. INTERLOCK WITH KITCHEN EQUIPMENT.
7. INTERLOCK WITH DISHWASHER CONTROL CIRCUIT.
8. INTERLOCK WITH KILN HOOD.
9. BUILDING CONTROL SYSTEM.
10. INTERLOCK WITH DRYER.
11. FAN TO BE ELECTRICALLY INTERLOCKED EITH THE ASSOCIATED AHU AND TERMINAL UNIT(S) (VAV AND/OR FPVAV) FOR OPERATION WHEN EXHAUST IS ACTIVATED.

FURNISHED BY OTHERS:

A. ELECTRIC DISCONNECT BY E.C..
B. VFD PROVIDED BY T.C.C. ON RELIEF FANS (RF-X).

NOTES

1. BELT DRIVE FAN SELECTIONS SHALL ACCOUNT FOR DRIVE LOSSES.
2. SEE SPECIFICATIONS FOR FAN TYPES.
3. ALL SWITCHES, INTERLOCKS, RELAYS, TRANSFORMERS, TIME CLOCKS, MOTOR STARTER, LINE VOLTAGE THERMOSTATS, ETC., BY E.C. UNLESS NOTED OTHERWISE.

PUMPS

MARK	MFR.	MODEL	SERVICE	FLOW RATE (GPM)	HEAD (FT.)	EFFICIENCY	VOLUTE	IMPELLOR	MOTOR HP	MOTOR RPM	MOTOR VOLTAGE	NOTES (SEE BELOW)
CP-1	LITTLE GIANT	EC-1-DV	CONDENSATE	0.03	5	--	--	--	--	--	115/1	--
CP-2	LITTLE GIANT	VCMA-15ULST	CONDENSATE	0.83	5	--	--	--	1/50	--	115/1	7
CP-3	LITTLE GIANT	VCMA-15ULST	CONDENSATE	0.83	5	--	--	--	1/50	--	110/1	7
CP-4	LITTLE GIANT	VCMA-15ULST	CONDENSATE	0.83	5	--	--	--	1/50	--	115/1	7
CP-5	LITTLE GIANT	VCMA-15ULST	CONDENSATE	0.83	5	--	--	--	1/50	--	115/1	7
CP-6	LITTLE GIANT	VCMA-15ULST	CONDENSATE	0.83	5	--	--	--	1/50	--	115/1	7

NOTES

1. ALL DOMESTIC HOT WATER PUMPS SHALL BE BRONZE OR SS CONSTRUCTION.
2. VARIABLE FREQUENCY DRIVE. (BY T.C.C.)
3. INTEGRAL TEMP. ELEMENT SET @ 140° F INTERLOCKED WITH DOM. HW BOILER.
4. 100% STAND-BY.
5. PARALLEL PUMPS.
6. SUBMERSIBLE PUMP WITH REMOTE VFD. VFD BY T.C.C.
7. PUMP WITH INTEGRAL CHECK VALVE.

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SEDWICK CO. ELECTIONS BUILDING
ELECTIONS AND RECORDS MANAGEMENT REMODEL

3639 N. COMOTARA ST.
WICHITA, KS 67226

REVISIONS
1 AD 1 11.03.2025

PROJECT NUMBER
5278.57

DATE
10.16.25

Mechanical Schedules

M70.2

Panel: P4

Load Type:	Voltage: 208/120	A.I.C. Rating: 10000A
L= Lighting, R=Receptacle, M=Motors,HO= Hotel K=Kitchen, H=HVAC, MI= Misc	Phase: Three	Mains Rating: 400A
	Wires: 4W + G	Main Breaker Size: 300A
	Enclousure: Type 1	Panel Lugs: Main Circuit Breaker
	Sections: One	Mounting: Surface

Circ No.	Load Description	Trip	Poles	Load	A	A	B	B	C	C	Load	Poles	Trip	Load Description	Circ No.
1	BUS DUCT	225	3	MI	11200	800					R	1	20	OUTLETS	2
3		225		MI			11200	800			R	1	20	OUTLETS	4
5		225		MI					11200	800	R	1	20	OUTLETS	6
7	SPD	60	3	MI		800					R	1	20	OUTLETS	8
9		60		MI				800			R	1	20	OUTLETS	10
11		60		MI						800	R	1	20	OUTLETS	12
13	OUTLETS	20	1	R	800	800					R	1	20	OUTLETS	14
15	OUTLETS	20	1	R			800	800			R	1	20	OUTLETS	16
17	OUTLETS	20	1	R					800	800	R	1	20	OUTLETS	18
19	OUTLETS	20	1	R	800	800					R	1	20	OUTLETS	20
21	OUTLETS	20	1	R			800	800			R	1	20	OUTLETS	22
23	OUTLETS	20	1	R					800	800	R	1	20	OUTLETS	24
25	OUTLETS	20	1	R	800	800					R	1	20	OUTLETS	26
27	OUTLETS	20	1	R			800	800			R	1	20	OUTLETS	28
29	OUTLETS	20	1	R					800	800	R	1	20	OUTLETS	30
31	OUTLETS	20	1	R	800	800					R	1	20	OUTLETS	32
33	OUTLETS	20	1	R			800	800			R	1	20	OUTLETS	34
35	OUTLETS	20	1	R					800	800	R	1	20	OUTLETS	36
37	OUTLETS	20	1	R	800	800					R	1	20	OUTLETS	38
39	OUTLETS	20	1	R			800					1	20	SPARE	40
41	SPARE	20	1									1	20	SPARE	42

a - Arc Fault Breaker b- Shunt Trip Breaker c - GFCI Breaker	Total (KVA)	A: 20.8 / B: 20 / C: 19.2
	Total Connected (KVA):	60.00
	Total Connected (Amps):	166.55

Notes:

Per NEC, Article 220 for Lighting and General Receptacle Loads

Load Summary

Load Classification	Connected Load (KVA)	Demand Factor	Demand (KVA)	Panel Totals	
Lights	0.0	1.25 Continuous	0.0		
Receptacles	26.4	Per NEC 220	18.2	Total Demand (KVA):	51.8
Motors	0.0	Per NEC 220	0.0	Demand Amps:	143.8
Hotel	0.0	Per NEC 220	0.0		
Kitchen	0.0	Per NEC 220	0.0		
HVAC	0.0	Per NEC 220	0.0		
Misc	33.6	1.00	33.6		

EQUIPMENT CONNECTION SCHEDULE

ICE - ELECTIONS BLDG.

SCH. CODE: SW=DISC. SW, CB=CIR.BKR., T=TOGGLE SW.

	UNIT DESIG	120/60/1	208/60/1	480/60/3 (1)	LOAD H.P.	LOAD FLA	LOAD MCA	PANEL DEVICE RATING (AMPS/POLE) 20/1	20/2	30/3	DISCONNECTING DEVICE AT UNIT (AMPS/POLE) FUSTAT	30/1	30/2	30/3	60/1	60/2	60/3	SIZE FUSE	NEMA3R	STARTER (SIZE/POLE)	CIRCUIT NUMBER	FEEDER IDENT.
	DDS-1(I)		●				1		●				SW								(4)	20/2
	DDS-1(O)		●				10		●				SW					20	●		(4)	20/2
	EF-1	●			1/8			●			●								●		(5)	20/1
(3)	RTU-2			●			23.3			●				SW				30	●		M1-11	30/3
	RTU-1X	EXISTING TO REMAIN																				
(3)	RTU-2X	TO BE REPLACED - SEE RTU-2																				
	RTU-3X	EXISTING TO REMAIN																				
	RTU-4X	EXISTING TO REMAIN																				
	RTU-5X	EXISTING TO REMAIN																				
	RTU-6X	EXISTING TO REMAIN																				
	RTU-7X	EXISTING TO REMAIN																				
	RTU-8X	EXISTING TO REMAIN																				
	RTU-9X	EXISTING TO REMAIN																				
	RTU-10X	EXISTING TO REMAIN																				
	RTU-11X	EXISTING TO REMAIN																				
	RTU-12X	EXISTING TO REMAIN																				
	RTU-13X	EXISTING TO REMAIN																				
	RTU-14X	EXISTING TO REMAIN																				
	RTU-15X	EXISTING TO REMAIN																				
	RTU-16X	EXISTING TO REMAIN																				
	CP-1	●			FR			●			●										(5)	20/1
	CP-2	●			FR			●			●										(5)	20/1
	CP-3	●			FR			●			●										(5)	20/1
	CP-4	●			FR			●			●										(5)	20/1
	DH-1	●				10		●			●										(6)	20/1
	DH-2	●				10		●			●										(6)	20/1
	DH-3	●				5.1		●			●										(6)	20/1

STARTER (SIZE/POLE) columns: 0/3, 1/3, 2/3, IN MCC, AT UNIT, NEMA3R.

EQUIPMENT CONNECTION SCHEDULE NOTES

ICE - ELECTIONS BLDG.

1. GENERAL CONTRACTOR SHALL PROVIDE FIREPROOFING AROUND RECESSED FIXTURES INSTALLED IN FIRE RATED CEILING PER U.L. REQUIREMENTS. ELECTRICAL CONTRACTOR SHALL COORDINATE.
2. SEE SPECIFICATIONS FOR LAMP AND BALLAST TYPE. VERIFY LAMP COLOR WITH ARCHITECT PRIOR TO ORDERING.
3. DISCONNECT EXISTING POWER BACK TO POINT OF SUPPLY - INSTALL NEW CIRCUIT (RTU-2) TO NEW 30/3 IN EXISTING PANEL "P1"
4. TO NEW 20/2 BREAKER IN EXISTING PANEL P2 - REMOVE CIRCUIT SUPPLY TO LAB OUTLET. OUTDOOR UNIT SUPPLIES INDOOR UNIT.
5. CONNECT TO 120V CIRCUIT IN AREA (VERIFY LOAD ON CIRCUIT PRIOR)
6. CONNECT TO 20/1 POLE BREAKER IN 120/208V PANEL.

SPECIAL OUTLET SCHEDULE

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
AC	ACCESS CONTROL BY SECURITY CONTRACTOR, ROUGH-IN BY ELECTRICAL CONTRACTOR
	TV OUTLET AND DUPLEX RECEPTACLE MOUNTED AT 84" AFF. ROUTE HDMI CABLE (1-1/4"C) TO BOX AND OUTLET AT 16" AFF.

FEEDER SCHEDULE

ICE - ELECTIONS BLDG.

FEEDER IDENT.	CONDUCTORS SETS	QUANT. PER SET	SIZE	GROUND SIZE PER SET	ISOLATED GRD. SIZE PER SET	CONDUIT SIZE PER SET
20/1	1	2	#12 CU	#12 CU	-------	1/2"
20/2	1	2	#12 CU	#12 CU	-------	1/2"
30/3	1	3	#10 CU	#10 CU	-------	1/2"
125/3	1	3	#1/0 AL	#4 AL	-------	1-1/2"
225/N	1	4	#300 MCM AL	#2 AL	-------	2-1/2"
300/N	1	4	#500 MCM AL	#2 AL	-------	3"
G2	1	1	-----	#2CU	-------	1/2"

1. ALUMINUM CONDUCTOR SHALL BE XHHW-2 (90° C) COMPACT STRANDED CONDUCTOR.

SYMBOL LIST

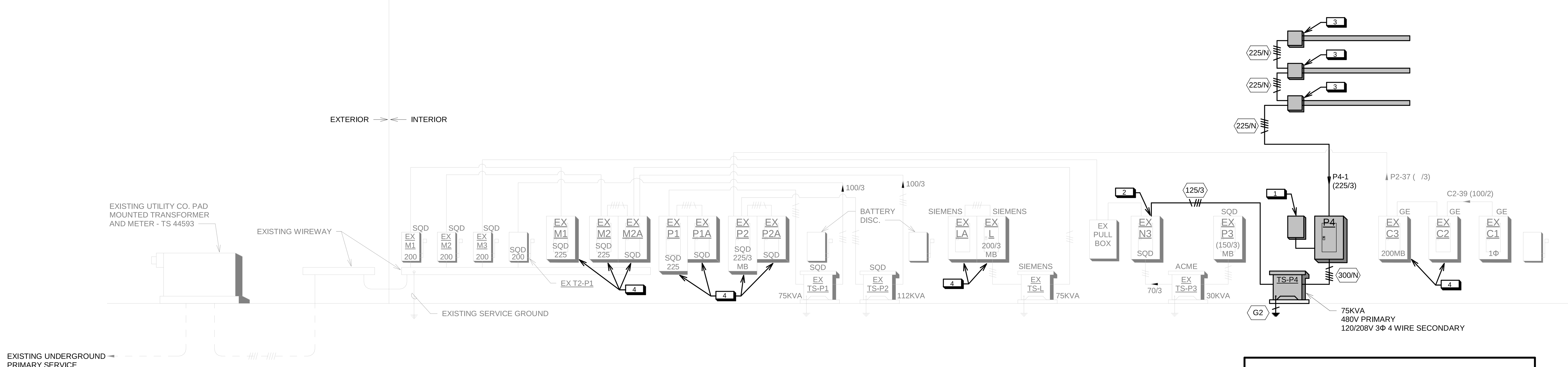
ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION	MOUNTING
(A)	LED FIXTURE & FIXTURE LETTER	CEILING
(A)	LED FIXTURE & FIXTURE LETTER	CEILING
(A) (A)	LED FIXTURE & FIXT. LETTER	SURF./RECESSED
(A)	LED FIXTURE & FIXT. LETTER	WALLBRACKET
	EXIT FIXT. - SHADING DENOTES FACE(S)	CEIL./WALL
	GFCI DUPLEX GROUNDED RECEPTACLE	1'-6" AFF
	DUPLEX GROUNDED RECEPTACLE	1'-6" AFF
	EXTERIOR GFCI RECEPT. WEATHERPROOF	1'-6" AFF
	DOUBLE DUPLEX RECEPTACLE	1'-6" AFF
	SPECIAL OUTLET, SEE SCHEDULE OR AS NOTED	
W P	TELEPHONE OUTLET (P=PAY, 44")(W= 44")	1'-6" AFF
\$ \$3 \$4 \$P \$K	SWITCHES (1-POLE,3-WAY,4-WAY,PILOT,KEY)	4'-0" TO TOP
D	DIMMER SWITCH	4'-0" TO TOP
J	JUNCTION BOX	
F	FUSTAT	
	SPECIAL DEVICE AS NOTED ON PLAN	
A	BRANCH CIRCUIT PANEL & PANEL DESIG.	6'-6"TO TOP
30/3/240	H.D. SAFETY SWITCH (AMPS,POLE,VOLTAGE)	6'-6"TO TOP
0/3/240	STARTER (SIZE,POLE,VOLTAGE)	6'-6"TO TOP
T	THERMOSTAT (BY M.C.)	4'-0" TO TOP
●	MOTOR	
	CONDUIT RUN 2#12 & 1#12 GRD.-1/2"C.	CEIL./WALL
	CONDUIT RUN 2 CIRCUIT,3#12 & 1#12 GRD.-1/2"C.	EARTH/FLOOR
	PARTIAL HOMERUN (MULTIPLE LOAD LOCATIONS)	
#10 30/3	SEE NOTE #7	
	CIRCUIT SUPPLIED FROM EMERGENCY SYSTEM	
200/N	FEEDER IDENTIFICATION, SEE SCHEDULE	
CT	SEE NOTE #8	
WP	WEATHERPROOF	
EM	ITEM SUPPLIED FROM EMERGENCY SYSTEM	
a,b,c	INDICATES SWITCHING SCHEME	
WG	WIRE GUARD ON DEVICE	
	SPEAKER	CEILING
	SPEAKER - HORN TYPE	
	PHONE/DATA OUTLET	1'-6" AFF
	TV OUTLET /DUPLEX REC SEE SPEC OUTLET SCH	
	FIRE ALARM MANUAL STATION	4'-0" TO TOP
	COMB. F.A. HORN & VISUAL SIGNAL	WALL 80"AFF
	FIRE ALARM HORN AND VISUAL SIGNAL	CEILING
V	FIRE ALARM VISUAL SIGNAL	CEILING
M	MOTION SENSOR WATTSTOPPER (14)	CEILING
	FIRE ALARM VISUAL SIGNAL	WALL 80"AFF
	AREA SMOKE DETECTOR, SEE GEN. NOTE #11	CEIL./WALL
■	MAGNETIC DOOR HOLD OPEN	
T	TIME SWITCH - WATTSTOPPER TS-400	4'-0" TO TOP
D	DUCT SMOKE DETECTOR	IN DUCT
D F/S	DUCT SMOKE DETECTOR AT FIRE/SMOKE DAMPER	IN DUCT
PO/TO	PHOTO-ON - TIME OFF	
PO/PO	PHOTO-ON - PHOTO-OFF	
H	HEAT DETECTOR	
U.N.O.	UNLESS NOTED OTHERWISE	
W WAC	WIRELESS ACCESS POINT	CEILING

GENERAL NOTES

ICE - ELECTIONS BLDG.

1. VERIFY ALL OUTLET LOCATIONS ON THE JOB PRIOR TO ROUGH-IN.
2. REFER TO RELATED ARCHITECTURAL, MECHANICAL, AND STRUCTURAL DRAWINGS FOR RELATED INFORMATION.
3. REFER TO THE SPECIFICATIONS FOR DATA NOT ON THE DRAWINGS.
4. COORDINATE OUTLET BOX LOCATIONS WITH MASONRY TO MINIMIZE CUTTING OF BRICK OR BLOCK.
5. ALL MOUNTING HEIGHTS TO BOTTOM OF ITEM UNLESS OTHERWISE NOTED.
6. E.C. SHALL REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS FOR THE REQUIREMENTS ASSOCIATED WITH WIRING AND CONNECTION OF INTERLOCKING AND CONTROLS OF MECHANICAL UNITS AND THERMOSTAT LOCATIONS.
7. CONDUIT RUN W/CONDUCTORS AS INDICATED, CONDUIT SIZE AS REQUIRED. CONDUIT RUN TO PANEL DEVICE SIZE AS INDICATED (AMP/POLE). CIRCUIT WITHOUT INDICATION IS ROUTED TO 20A.,1P. BREAKER.
8. "CT" INDICATED ADJACENT TO DEVICE INDICATES DEVICE IS MOUNTED ABOVE BACKSPLASH OF COUNTER TOP. VERIFY EXACT HEIGHT WITH ARCHITECTURAL PLANS AND ELEVATIONS.
9. A GROUND CONDUCTOR SIZED PER N. E. C. ARTICLE 250 IS REQUIRED IN ALL POWER, RECEPTACLE, AND LIGHTING CIRCUITS. GROUND CONDUCTORS ARE NOT SHOWN ON DRAWINGS.
10. WHERE AREA SMOKE DETECTORS ARE SHOWN ON THE DRAWINGS ELECTRICAL CONTRACTOR SHALL NOT LOCATE SMOKE DETECTORS CLOSER THAN 3 FEET FROM ANY MECHANICAL AIR SUPPLY OR RETURN DIFFUSER, GRILLE, OR REGISTER PER NFPA. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH OTHER TRADES FOR LOCATION OF DETECTOR.
11. AT EVERY SMOKE OR FIRE/SMOKE DAMPER ELECTRICAL CONTRACTOR SHALL INSTALL A RELAY TO CLOSE DAMPER AND SHUT DOWN ASSOCIATED MECH. UNIT ON ACTIVATION OF DETECTOR. REFER TO MECHANICAL PLANS AND SPECIFICATIONS FOR LOCATIONS AND CONTROL REQUIREMENTS. PROVIDE 120V. CONTROL POWER AT DAMPER IF REQUIRED. IF REQUIRED BY THE FIRE ALARM SYSTEM SUPPLIER, MECHANICAL CONTRACTOR SHALL MODIFY DUCTWORK WHERE FIRE/SMOKE DAMPERS ARE LOCATED AS REQUIRED TO INSTALL DUCT SMOKE DETECTORS IN THE DUCTWORK AT THE FIRE/SMOKE DAMPER LOCATIONS.
12. SECURITY CONTRACTOR (SANDIFER ENGINEERING) IS PROVIDING EQUIPMENT FOR PROJECT AND WILL BE BID TO CENTRAL. ELECTRICAL CONTRACTORS CONDUIT, AND CABLING PER SECURITY CONTRACTORS INFORMATION TO BE INCLUDED IN BID. (1)
13. ADJUST ALL MOTION SENSORS TO MINIMUM. PROVIDE ADDITIONAL CONTACT ON SENSOR FOR MECH. EQUIPMENT.
14. WATT STOPPER DT-355 OR DT300 WITH POWER PAC.
15. NEW CAT 6E PHONE/DATA CABLE TO BE INSTALLED AND EXISTING CABLING REMOVED. ALL INSTALLATION SHALL MEET SEDGWICK COUNTY SPECIFICATIONS.
16. PROVIDE AND INSTALL NEW FIRE ALARM DEVICES TO EXISTING FIRE ALARM SYSTEM.



A ELECTRICAL SERVICE ENTRANCE AND DISTRIBUTION RISER DIAGRAM

SCALE: N.T.S.

VOLTAGE: 277/480V 3Φ 4W

RISER NOTES

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
1	CURRENT TECHNOLOGY "SPD" #CG3-060-208Y-PLUF FEEDER SUPPLIED BY MANUFACTURER.
2	ADD NEW SQ "D" 125A 3P BREAKER FOR TS-P4.
3	STARLINE 225A T3 SERIES TRACK BUSWAY - STANDARD FINISH. LENGTH AS SHOWN ON FLOOR PLAN. SEE DETAIL. CORD DROPS AND RECEPTACLES AS SHOWN ON PLAN.
4	CONTRACTOR SHALL USE SPARE 20/1 BREAKERS IN EXISTING PANEL AS NEEDED. IF SPARES ARE NOT IN THE PANEL, A NON USE 3Φ BREAKER CAN BE REMOVED AND 20/1 POLE BREAKERS INSTALLED AND USED. EXISTING - NON USED 3Φ FEEDER AND OUTLET SHALL BE REMOVED BACK TO POINT OF SUPPLY.

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SEDGWICK COUNTY
ELECTIONS AND RECORDS MANAGEMENT REMODEL
3639 N. Comotara St., Wichita, KS 67226

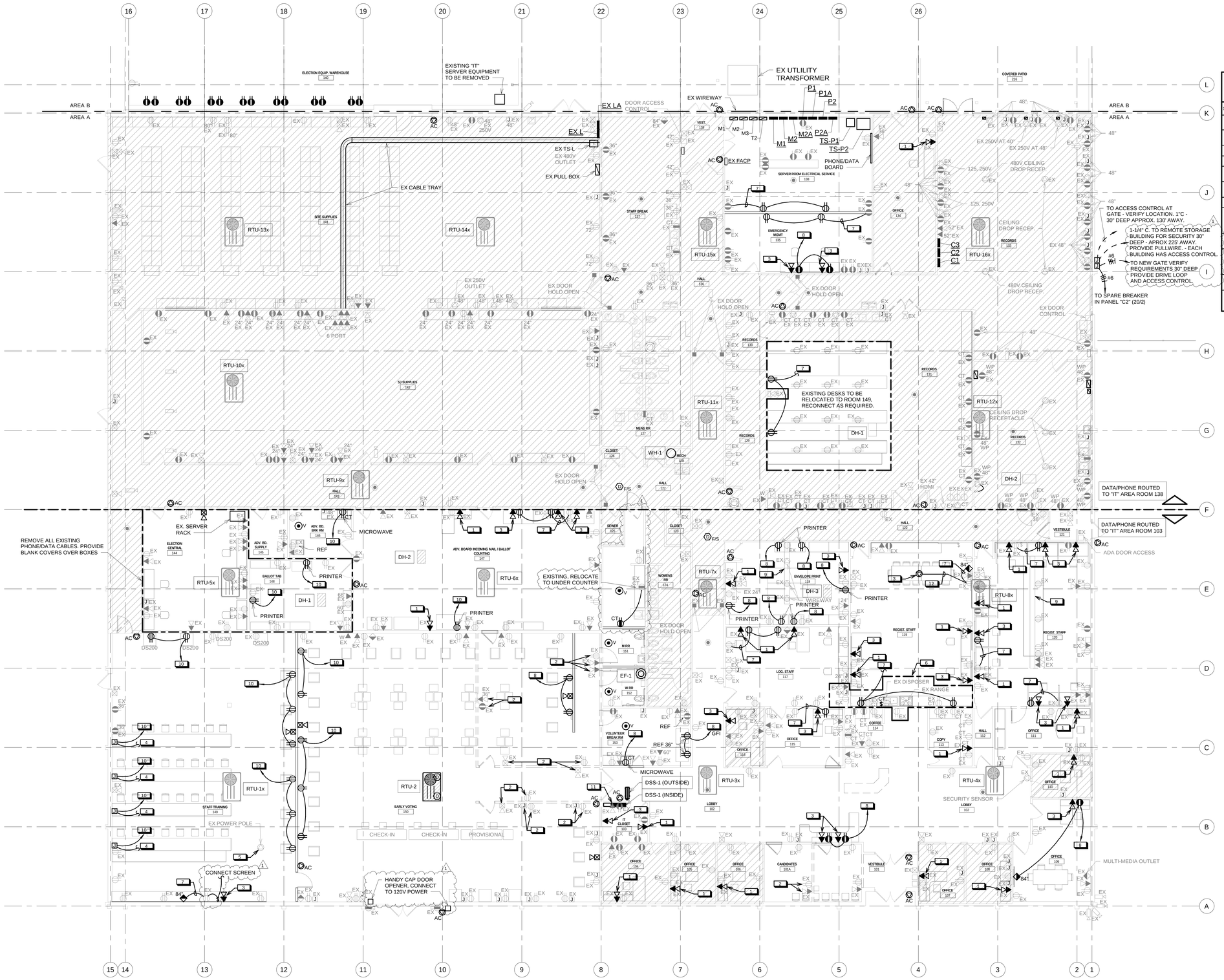
REVISIONS
1 AD 1 11.03.2025

PROJECT NUMBER 5278.57

DATE 10.16.25

ELECTRICAL SCHEDULES

E1.1



PLAN NOTES

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
1	REMOVE EXISTING PHONE/DATA CABLE AND INSTALL NEW PHONE/DATA CABLE (1) PHONE (6) (1) DATA (6)
2	REMOVE EXISTING PHONE/DATA AND RECEPTACLES FROM REMOVED WALL.
3	NEW PHONE/DATA LOCATIONS. EACH OUTLET REQUIRES CAT 6 CABLE.
4	RECONNECT EXISTING DESK, SIMILAR TO EXISTING.
5	REMOVE EXISTING POWER POLE, CIRCUIT COULD BE USED FOR NEW IN AREA.
6	REMOVE EXISTING RANGE, DISPOSAL AND COUNTERTOP OUTLETS BACK TO POINT OF SUPPLY.
7	RECONNECT TO EXISTING RECEPTACLE CIRCUIT.
8	TO NEW OR EXISTING 20/1 BREAKER IN EXISTING 120/208V PANEL. REPLACE EXISTING UNUSED 3P. BREAKERS NOT NEEDED AND REPLACE WITH 20/1 BREAKERS REMOVE EXISTING 3Φ OUTLET AND FEEDER AS NEEDED.
9	REMOVE EXISTING SURFACE WIREMOLD RACEWAY ON FLOOR BACK TO POINT OF SUPPLY.
10	TO NEW OR EXISTING 20/1 BREAKER IN EXISTING 120/208V PANEL "L" OR "LA". REPLACE EXISTING UNUSED 3P. BREAKERS NOT NEEDED AND REPLACE WITH 20/1 BREAKERS REMOVE EXISTING 3Φ OUTLET AND FEEDER AS NEEDED.
11	REMOVE EXISTING PHONE/DATA CABLE BACK TO SUPPLY LOCATION. PROVIDE BLACK COVER OVER OUTLET BOX.
12	SURFACE RACEWAY ON FLOOR UNDER CARPET FOR PHONE/DATA/POWER LEGRAND CONNECTRAC SYSTEM, PROVIDE ALL PARTS AS REQUIRED FOR COMPLETE SYSTEM.

ALL REMOVED DATA/PHONE BOXES NOT REUSED SHALL HAVE BLANK COVERS INSTALLED.

NOTES:

1. BRANCH CIRCUITS ARE INDICATED AS ONE CIRCUIT HOME RUNS FOR CLARITY ONLY, CONTRACTOR MAY GROUP SINGLE POLE BRANCH CIRCUITS IN MULTIPLE CIRCUIT HOME RUNS. (3 CIRCUIT MAXIMUM). EACH CIRCUIT WILL REQUIRE A SEPARATE, HOT & NEUTRAL CONDUCTOR. A GROUND CONDUCTOR SIZED PER N.E.C. ARTICLE 250 IS REQUIRED IN ALL POWER RECEPTACLE, AND LIGHTING CIRCUITS.
2. FOR ELECTRICAL CONNECTIONS TO ITEMS SUPPLIED BY OTHER CONTRACTORS, SEE EQUIPMENT CONNECTION SCHEDULE.

A FLOOR PLAN AREA A - POWER

SCALE: 1/8" = 1'-0"

NORTH

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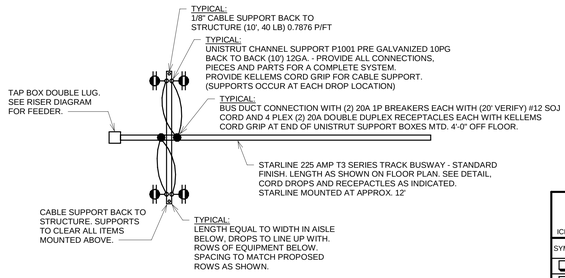
FLOOR PLAN AREA A - POWER

E2.1



B STARLINE BUS DUCT DETAIL

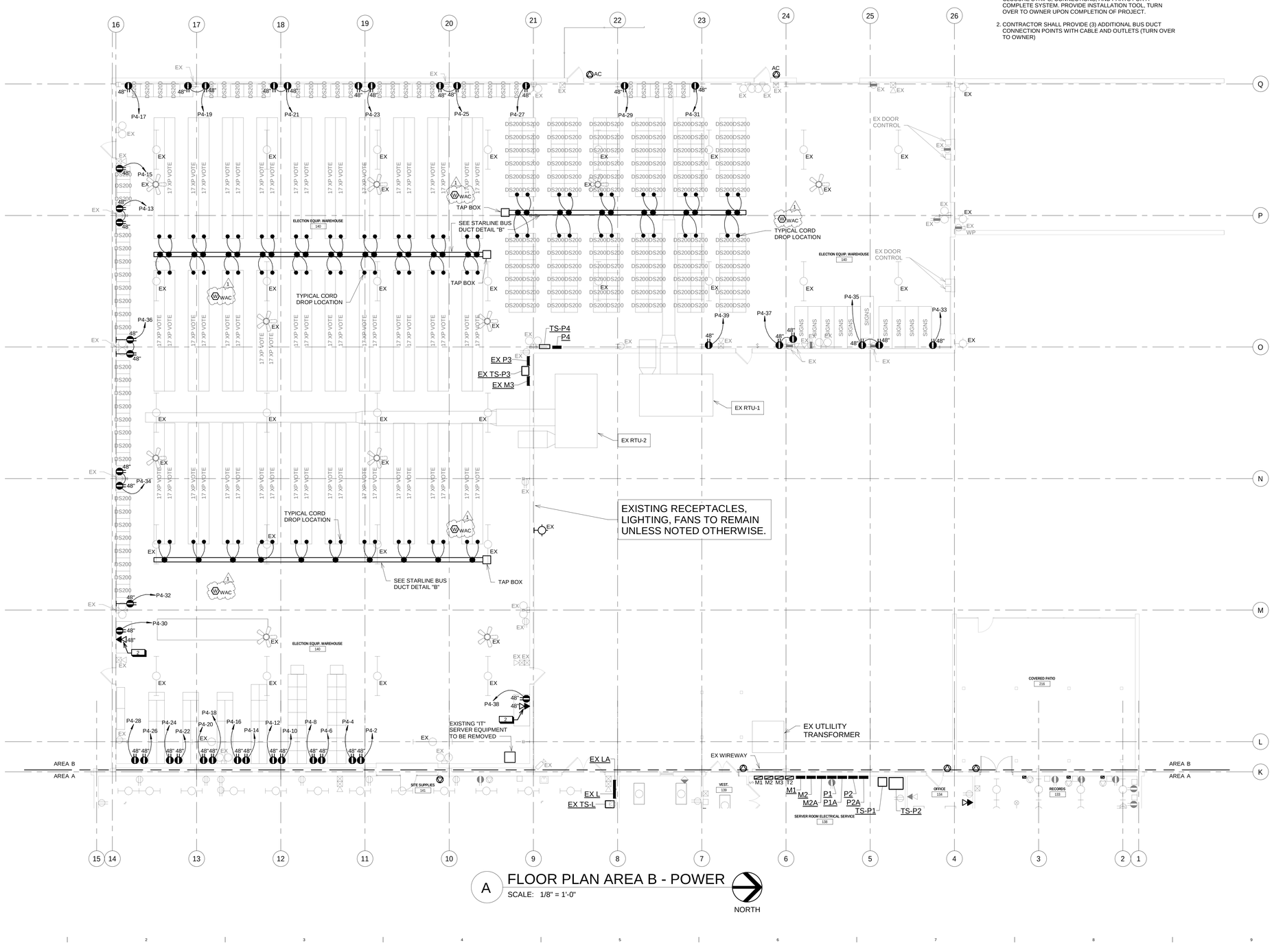
SCALE: N.T.S. VOLTAGE 120/208V 3Φ 4W

1. NOTES:
   CONTRACTOR SHALL PROVIDE ALL SPLICE KITS, ENDCAPS, CLOSURE STRIPS, CONNECTIONS, AND PARTS FOR A COMPLETE SYSTEM. PROVIDE INSTALLATION TOOL, TURN OVER TO OWNER UPON COMPLETION OF PROJECT.
2. CONTRACTOR SHALL PROVIDE (3) ADDITIONAL BUS DUCT CONNECTION POINTS WITH CABLE AND OUTLETS (TURN OVER TO OWNER)

PLAN NOTES

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
1	TYPICAL BUS DUCT CORD DROP - SEE DETAIL.
2	NEW PHONE/DATA LOCATION, EACH OUTLET REQUIRES A CAT 6 CABLE.



A FLOOR PLAN AREA B - POWER

SCALE: 1/8" = 1'-0"

NORTH

NOTES:

1. BRANCH CIRCUITS ARE INDICATED AS ONE CIRCUIT HOME RUNS FOR CLARITY ONLY, CONTRACTOR MAY GROUP SINGLE POLE BRANCH CIRCUITS IN MULTIPLE CIRCUIT HOME RUNS. (3 CIRCUIT MAXIMUM). EACH CIRCUIT WILL REQUIRE A SEPARATE, HOT & NEUTRAL CONDUCTOR. A GROUND CONDUCTOR SIZED PER N.E.C. ARTICLE 250 IS REQUIRED IN ALL POWER RECEPTACLE, AND LIGHTING CIRCUITS.
2. FOR ELECTRICAL CONNECTIONS TO ITEMS SUPPLIED BY OTHER CONTRACTORS, SEE EQUIPMENT CONNECTION SCHEDULE.

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FLOOR PLAN AREA B - POWER

E2.2

A FLOOR PLAN AREA A - LIGHTING

SCALE: 1/8" = 1'-0"

NORTH

PLAN NOTES

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
1	REMOVE SWITCH, RECONNECT EXISTING FIXTURES TO EXISTING REMAINING ROOM SWITCH - REWIRE AS NEEDED.
2	CONTRACTOR SHALL REMOVE EXISTING FIXTURES AND RELOCATE AS SHOWN. INSTALL NEW SWITCHING AS NOTED. RELOCATE EMERGENCY LIGHTS AND EXIT LIGHTS AS INDICATED. RECONNECT TO EXISTING CIRCUITS.
3	EXISTING RELOCATED FIXTURE.
4	RELOCATE FIRE ALARM DEVICE TO NEW WALL.

NOTES:

1. BRANCH CIRCUITS ARE INDICATED AS ONE CIRCUIT HOME RUNS FOR CLARITY ONLY. CONTRACTOR MAY GROUP SINGLE POLE BRANCH CIRCUITS IN MULTIPLE CIRCUIT HOME RUNS. (3 CIRCUIT MAXIMUM). EACH CIRCUIT WILL REQUIRE A SEPARATE, HOT & NEUTRAL CONDUCTOR. A GROUND CONDUCTOR SIZED PER N.E.C. ARTICLE 250 IS REQUIRED IN ALL POWER RECEPTACLE, AND LIGHTING CIRCUITS.
2. FOR ELECTRICAL CONNECTIONS TO ITEMS SUPPLIED BY OTHER CONTRACTORS, SEE EQUIPMENT CONNECTION SCHEDULE.

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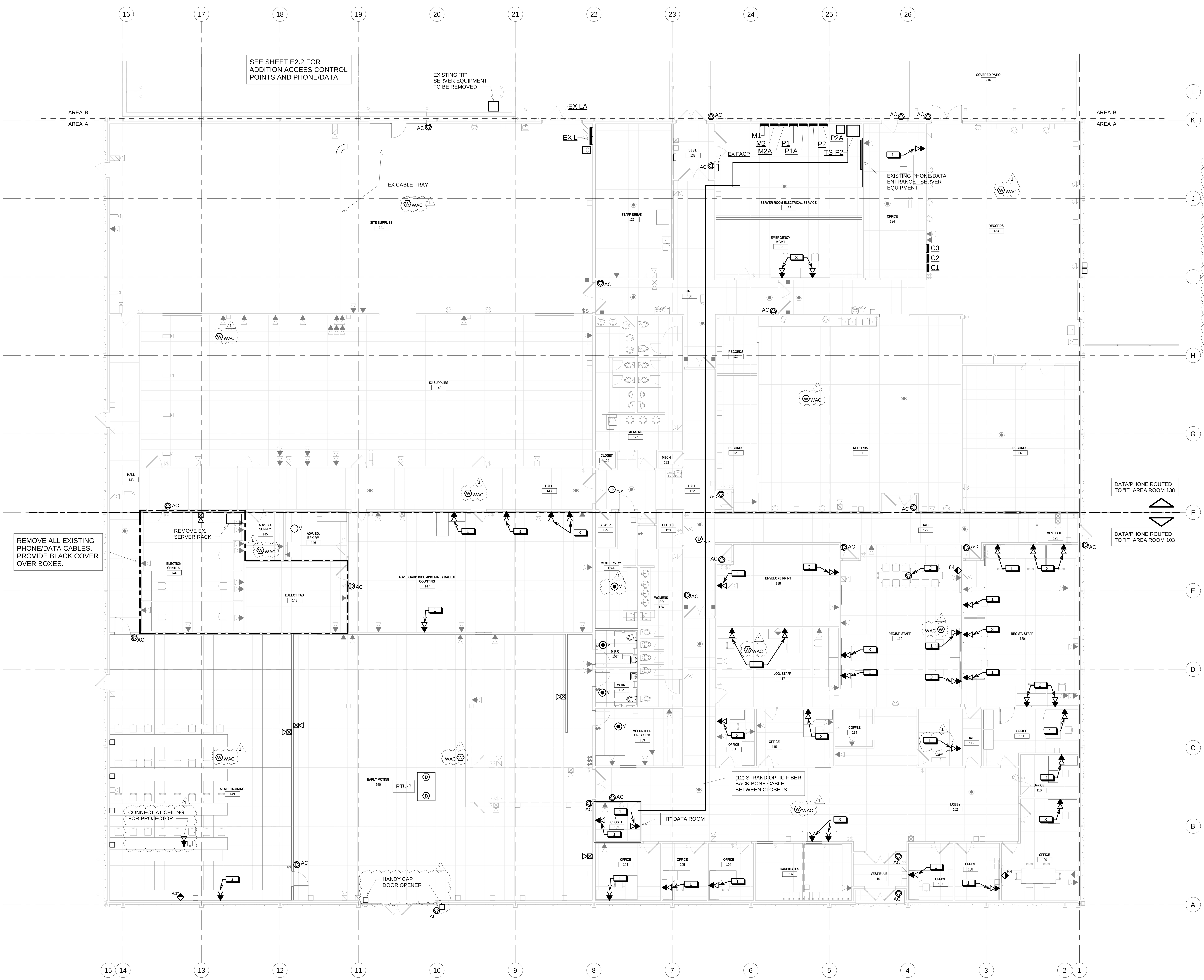
FLOOR PLAN AREA A - LIGHTING

E3.1



A FLOOR PLAN AREA A - SYSTEMS

SCALE: 1/8" = 1'-0"

NORTH

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PLAN NOTES

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION
1	REMOVE EXISTING PHONE/DATA CABLE AND INSTALL NEW PHONE/DATA CABLE (1) PHONE (6) (1) DATA (6)
2	NEW PHONE/DATA LOCATIONS, EACH OUTLET REQUIRES CAT 6 CABLE.

SYMBOL LIST

ICE - ELECTIONS BLDG.

SYMBOL	DESCRIPTION	MOUNTING
▼ ▼W ▼P	TELEPHONE OUTLET (P=PAY, 44")(W= 44")	1'-6" AFF
	SPEAKER	CEILING
	SPEAKER - HORN TYPE	
	PHONE/DATA OUTLET	1'-6" AFF
	FIRE ALARM MANUAL STATION	4'-0" TO TOP
	COMB. F.A. HORN & VISUAL SIGNAL	WALL 80"AFF
	FIRE ALARM HORN AND VISUAL SIGNAL	CEILING
V	FIRE ALARM VISUAL SIGNAL	CEILING
	FIRE ALARM VISUAL SIGNAL	WALL 80"AFF
	AREA SMOKE DETECTOR, SEE GEN. NOTE #11	CEIL./WALL
D	DUCT SMOKE DETECTOR	IN DUCT
D F/S	DUCT SMOKE DETECTOR AT FIRE/SMOKE DAMPER	IN DUCT
H	HEAT DETECTOR	
W WAC	WIRELESS ACCESS POINT	CEILING
AC	ACCESS CONTROL	

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FLOOR PLAN AREA A - SYSTEMS

E4.1