24 April 2026

SAKAKAWEA MEDICAL CENTER
MRI ADDITION &
TEMPORARY INFUSION RENOVATION

Hazen ND

BWBR Commission No. P.2500423.00

Construction Documents Issue

Bid Pack 01

SAKAKAWEA MEDICAL CENTER
MRI ADDITION &
TEMPORARY INFUSION RENOVATION

CONSTRUCTION DOCUMENTS ISSUE – BID PACK 01

BWBR Commission No. P.2500423.00

24 April 2026

Prepared by

architect
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DOCUMENT 00-0105 - CERTIFICATIONS PAGE

SMC – MRI Addition & Temporary Infusion Renovation

BWBR Project No. P.2500423.00

24 April 2026

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect or Professional Engineer under the laws of the State of North Dakota.

RYAN D. JOHANSEN, ARCHITECT LICENSE NO. 2661

STEVE J. HOEPFNER, MECHANICAL ENGINEER LICENSE NO. PE-8407

ANTHONY R. NELSON, ELECTRICAL ENGINEER LICENSE NO. PE-6251

END OF DOCUMENT

DOCUMENT 00-0110 - TABLE OF CONTENTS

DIVISION 21 - FIRE SUPPRESSION

DIVISION 22 - PLUMBING

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

DIVISION 26 - ELECTRICAL

END OF DOCUMENT

DOCUMENT 00-2605 - PRIOR APPROVAL OF SUBSTITUTIONS

1.01 SECTION INCLUDES

A. Requirements for submitting substitution proposals before award of Contract.

B. Specified items and manufacturers establish the standard of design, function, and quality. Substitutions shall equal or exceed those standards.

1.02 RELATED SECTIONS

A. Section 01-2500 - Substitution Procedures: Substitution proposals after award of Contract.

1.03 LIMITATION OF SUBSTITUTION

A. Where a material, product, or system is specifically named followed by the words "no substitution", substitutions will not be considered.

B. Where more than one manufacturer, material, product, or system is listed under the same heading, the Bidder may select any of those listed that comply with the Specifications. Minor and normal variations from specifications will be considered, subject to acceptance by the Architect.

C. Where a manufacturer, material, product, or system is specifically named followed by the words "or other by prior approval", substitution will be considered only during the bidding period.

D. Where a manufacturer, material, product, or system is named without limitation of substitution, or the list of acceptable manufacturers or products includes the words "as approved", approval of substitution prior to bid opening may be requested but is not required. If substitution of a material or product that is not specified is proposed after award of Contract, written request shall be made to the Architect before purchase or use. If not accepted, the Contractor shall provide a named product or material without change in cost to the Owner.

E. Prior approval requests will be accepted only from prime contract bidders. The Architect will not respond to requests received from other sources.

1.04 PRIOR APPROVAL OF SUBSTITUTION

A. Written request for approval of substitution prior to bid opening shall be received by the Architect at least 10 days before the date of bid opening.

B. Use Document 00-2610 - Request for Prior Approval of Substitution as a cover sheet for submittals. Similar cover pages that contain the same information are acceptable.

1.05 SUBMITTAL REQUIREMENTS

A. Clearly identify the material, product, or system for which the substitution is requested by specification section number, article, and paragraph.

B. General references to sales brochures or other nonspecific information are not acceptable and will be rejected.

C. Furnish specific technical description and illustrations of the substitution and how it relates to the Work.

D. Identify differences between proposed and specified products.

E. Furnish supporting Spec-Data and Manu-Spec sheets when available.

F. Furnish supporting samples of materials, fabrication details, assemblies, and finishes as requested.

G. If any part of the construction must be changed because of acceptance of substitution, the cost of those changes shall be included in the Bid.

H. Ensure pdf submittals are clear and legible.

1.06 RESPONSE TO SUBMITTALS

A. If written response to the Bidder is requested, include a stamped, self-addressed envelope with each substitution request. If not included, no response will be made. Written response to substitution requests will be made at the convenience of the Architect as time allows.

B. Official response to requests for substitution will be made by Addendum. Only accepted items will be listed. Bidders shall not rely on approvals made in any other manner.

C. Submittals that do not clearly identify required information, or that are difficult to read, may be rejected without comment.

END OF DOCUMENT

DOCUMENT 00-2610 - REQUEST FOR PRIOR APPROVAL, ARCHITECTURAL

TO: BWBR
380 St. Peter Street, Suite 600
St. Paul MN 55102
Send e-mail to April Kick - AKick@bwbr.com

PART 1 - IDENTIFICATION

Specification Section No. _____ Paragraph No. _____

Specified product: _____

Proposed substitution: _____

Reason for substitution: _____

PART 2 - CONTRACTOR'S EVALUATION

A.	Does the proposed substitution fail to satisfy specifications in any respect?	Yes	No
B.	Does the proposed substitution affect dimensions indicated on the Drawings?	Yes	No
C.	Does the substitution affect other trades?	Yes	No
D.	Does warranty differ from that specified?	Yes	No

PART 3 - ATTACHMENTS

If you answered "Yes" to any of the items above, attach a complete explanation on your company letterhead. Explain all differences between the proposed substitution and the specified product, and summarize your experience with the proposed product in this area.

Attach manufacturer's product information adequate to allow evaluation of the proposed substitution. Highlight or circle relevant information, or cross out information that does not apply to this project. Identify differences between proposed and specified products.

Approval will not relieve the Contractor from full compliance with the Contract Documents.

Submitted by: *(this part to be filled out by prime contract bidder, not supplier)*

Signature: _____ Date: _____

Name: _____ Title: _____

Company: _____ Phone: _____

Address: _____ Cell phone: _____

Email Address: _____ Fax: _____

PART 4 - ARCHITECT'S ACTION

Accepted Accepted as noted Not accepted

By: _____ Date: _____

Remarks: _____

_____

END OF DOCUMENT

DOCUMENT 00-2611 - REQUEST FOR PRIOR APPROVAL, MECHANICAL/ELECTRICAL

TO: CMTA
2201 12TH Street North, Suite E
Fargo ND 58102
Send e-mail to Steve Hoepfner (M) Steve.Hoepfner@cmta.com
Tony Nelson (E) tony.nelson@cmta.com

and

BWBR
380 St. Peter Street, Suite 600
St. Paul MN 55102
and April Kick, AKick@bwbr.com

PART 1 - IDENTIFICATION

Specification Section No. _____ Paragraph No. _____

Specified product: _____

Proposed substitution: _____

Reason for substitution: _____

PART 2 - CONTRACTOR'S EVALUATION

A.	Does the proposed substitution fail to satisfy specifications in any respect?	Yes	No
B.	Does the proposed substitution affect dimensions indicated on the Drawings?	Yes	No
C.	Does the substitution affect other trades?	Yes	No
D.	Does warranty differ from that specified?	Yes	No

PART 3 - ATTACHMENTS

If you answered "Yes" to any of the items above, attach a complete explanation on your company letterhead. Explain all differences between the proposed substitution and the specified product, and summarize your experience with the proposed product in this area.

Attach manufacturer's product information adequate to allow evaluation of the proposed substitution. Highlight or circle relevant information, or cross out information that does not apply to this project. Identify differences between proposed and specified products.

Approval will not relieve the Contractor from full compliance with the Contract Documents.

Submitted by: *(this part to be filled out by prime contract bidder, not supplier)*

Signature: _____ Date: _____

Name: _____ Title: _____

Company: _____ Phone: _____

Address: _____ Cell phone: _____

Email Address: _____ Fax: _____

PART 4 - ENGINEER'S ACTION

Accepted Accepted as noted Not accepted

By: _____ Date: _____

Remarks: _____

_____

END OF DOCUMENT

DOCUMENT 00-7375 - ELECTRONIC FILES FOR BIDDING AND CONSTRUCTION

1.01 TERMS AND CONDITIONS FOR USE

A. BWBR Architects, Inc., and its consultants grant Bidders and Contractors a limited license to use Electronic Documents issued by BWBR Architects, Inc., exclusively for this Project.

B. By using the Electronic Documents, Recipient agrees to the following terms and conditions.

C. Recipient may use the Electronic Documents for any purpose related to the Project, as long as Recipient is a separate consultant or contractor engaged by the Client, or a sub-consultant, subcontractor, or supplier, of any tier, to anyone engaged by the Client for the Project.

D. The Electronic Documents are not Contract Documents. The printed copies of original Drawings and Specifications, signed and sealed by BWBR or its consultants and incorporated in agreements between the Client and any contractor for the Project are Contract Documents. Without limiting the generality of the foregoing, Electronic Documents that include a portion of the information contained in the Contract Documents are not Contract Documents.

E. Recipient may copy and use Electronic Documents that are preliminary, or are otherwise not incorporated in the final Contract Documents, for backgrounds for consultant drawings, scheduling, cost estimating, and other pre-construction purposes.

F. Recipient may copy and use Electronic Documents that are incorporated in the Contract Documents as backgrounds for Shop Drawings, layout, and other purposes related to the Project, provided (a) Recipient shall be responsible for verifying actual construction or field conditions, and (b) Recipient may rely on the Electronic Documents only to the extent Recipient has determined the Electronic Documents are consistent with the Contract Documents and field conditions.

G. Recipient shall be responsible for determining whether any changes made after Recipient receives the Electronic Documents affect any services or work Recipient provided using the Electronic Documents and for updating any such services or work to the extent necessary.

H. The Recipient shall be responsible for determining if the Electronic Documents are sufficient for Recipient's purposes.

I. If BWBR provides the Electronic Documents in a format that is subject to copying, editing, or other manipulation by Recipient, Recipient may copy, edit, and use the Electronic Documents to produce drawings, specifications, Shop Drawings, cost estimates, material take-offs, and any other lawful purpose related to Recipient's duties on the Project, provided Recipient shall be solely responsible for Recipient's resulting documents and work.

J. BWBR and the Client provide no warranties, express or implied, including warranties of merchantability or fitness for a particular purpose for the Electronic Documents.

K. To the fullest extent allowed by law, Recipient agrees to indemnify, defend, and hold harmless BWBR and its consultants from any costs (including attorneys' fees and costs), claims, or causes of action, to the extent arising from Recipient's negligent or wrongful use of the Electronic Documents, including Recipient's modification or unlicensed use of the Electronic Documents.

L. BWBR shall not be responsible for any failure of Recipient to accurately reproduce the Electronic Documents. Recipient shall be responsible for confirming the compatibility of the Electronic Documents with Recipient's hardware and software. In the case of any discrepancies between information Recipient produces using the Electronic Documents and information BWBR produces, printed copies produced by BWBR shall control.

M. BWBR shall not be responsible for any decline in accuracy or readability due to the medium on which the Electronic Documents are stored, or for any unintentional transmission of computer viruses.

N. The Electronic Documents are the property of BWBR, subject only to the rights, if any, of the Client and BWBR's consultants as defined in the agreement between BWBR and its Client. All Electronic Documents are to be treated as confidential and are not to be disclosed to or shared with others, except under the terms and conditions of this transmittal, without the express written consent of BWBR.

O. These terms and conditions apply to all Electronic Documents issued by BWBR or its consultants for the Project.

END OF DOCUMENT

SECTION 01-1100 - SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction progress schedules.
B. Work by Owner.
C. Owner-furnished products.
D. Contractor use of site and premises.
E. Subcontracts.
F. Work on building envelope.

1.02 CONTRACT DESCRIPTION

A. Work of this Contract comprises an MRI Addition and temporary Infusion Renovation at the Sakakawea Medical Center (SMC) in Hazen, North Dakota.
B. The project is divided into bid packages:
    1. Bid Pack 1 - Temporary Infusion Renovation.
    2. Bid Pack 2 - MRI Addition.

1.03 CONSTRUCTION PROGRESS SCHEDULES

A. Submit a horizontal bar chart with separate bars for each major trade or operation, identifying first work day of each week. At Contractor's option, a Critical Path Method (CPM) schedule that includes a horizontal bar chart may be submitted.
B. Show complete sequence of construction by specification section activities, identifying work of separate stages and other logically grouped activities. Show projected percentages of completion for each item as of time of each application for payment.
C. Show submittal dates required for Product Data, Samples, and Shop Drawings, and product delivery dates. Identify long lead time submittals for manufacture or fabrication. Include 14 days for Architect review of each submittal.
D. Show changes occurring since previous schedule, including, major changes in scope of Work, activities modified since previous schedule, revised projections of progress and completion.

1.04 WORK BY OWNER

A. Items noted 'NIC' (not in Contract) will be furnished and installed by the Owner.
B. Equipment provided by Owner showing:
    1. OFCI (Owner Furnished Contractor Installed) for items furnished by the Owner and installed by the Contractor.
    2. OFOI (Owner Furnished Owner Installed) for items furnished and installed by the Owner.
    3. OFVI (Owner Furnished Vendor Installed) for items furnished by Owner and installed by the by the Owner’s Vendor.

1.05 OWNER-FURNISHED PRODUCTS

A. Owner's responsibilities:
    1. Arrange for and deliver Owner-reviewed Product Data, Samples, and Shop Drawings to the Contractor, as specified in Section 01-3300.
    2. Arrange and pay for product delivery to site.
    3. On delivery, inspect products jointly with the Contractor.
    4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
    5. Arrange and pay for manufacturers' warranties, inspections, and service.
B. Contractor's responsibilities:
    1. Review Owner-reviewed Product Data, Samples, and Shop Drawings.
    2. Receive and unload products at site, and inspect for completeness or damage, jointly with the Owner.
    3. Handle, store, install, and finish products.
    4. Repair or replace items damaged after receipt.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. The Owner will occupy the premises during the entire period of construction for the conduct of normal operations.

B. Limit use of site and premises to allow Owner occupancy and operations. Cooperate with the Owner to minimize conflict, and to facilitate Owner's operations.

C. Notify the Owner and other contractors of intentional utility outages, or interruption of fire or life safety systems and shutdown 5 days in advance. Earlier notification may be required for some events.

D. Construction personnel shall comply with Owner's dress code, and with other Owner regulations.

E. Smoking is not permitted at the site.

1.07 SUBCONTRACTS

A. Assign and coordinate all work indicated in the Contract Documents.

B. Coordinate concealed blocking requirements of subcontractors, products, and equipment indicated in the Contract Documents, and ensure concealed blocking is provided as required.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-2500 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requests for substitution after award of Contract.

1.02 SUBMITTALS

A. No substitution will be considered for items requiring prior approval, except where necessary because of strikes, lockouts, bankruptcy, or discontinuance of product. Submit requests for substitution to the Architect within 10 days after determination that the specified item is not available.

B. Submit requests for other substitution to the Architect at least 10 days before the item is to be ordered.

C. Submit requests for substitution using Section 01-2501 - Request for Approval of Substitution form as a cover letter.

D. Approved substitutions will be identified in writing by the Architect.

E. By making requests for substitutions, the Contractor:

1. Represents that the Contractor has investigated the proposed substitution and has determined that it is equal or superior to the item specified.
2. Represents that the Contractor will provide the same warranty for the substitute item as originally specified.
3. Certifies that the cost data presented is complete and includes all related costs except the Architect's redesign costs, and waives all claims for additional costs or extension of time related to the substitution that are not described in the request.
4. Agrees to coordinate the installation of accepted substitute product or materials, making such changes as may be required for the Work to be complete in all respects.

F. If a substitution request is not approved, provide a listed or approved item at no additional cost.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-2501 - REQUEST FOR APPROVAL OF SUBSTITUTION

TO: BWBR
380 St. Peter Street, Suite 600
St. Paul MN 55102

PART 1 - IDENTIFICATION

Specification Section No. _____ Paragraph No. _____

Specified product: _____

Proposed substitution: _____

Reason for substitution: _____

PART 2 - CONTRACTOR'S EVALUATION

A.	Does the proposed substitution fail to satisfy in any respect, requirements for the specified product?	Yes	No
B.	Does the proposed substitution affect dimensions indicated on the Drawings?	Yes	No
C.	Does the substitution affect other trades?	Yes	No
D.	Does warranty differ from that specified?	Yes	No
E.	Will acceptance of this substitutions change the Contract Sum?	Yes	No

PART 3 - ATTACHMENTS

If you answered "Yes" to any of the above questions, attach a complete explanation on your company letterhead. Explain all differences between the proposed substitution and the specified product, and summarize your experience with the proposed product in this area.

Submitted by:

Signature: _____ Date: _____

Name: _____ Title: _____

Company: _____ Phone: _____

Address: _____ Cell phone: _____

Email Address: _____ Fax: _____

PART 4 - ARCHITECT'S ACTION

Accepted Accepted as noted Not accepted

By: _____ Date: _____

Remarks: _____

_____

SECTION 01-2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Do not proceed with changes in the Work without an executed copy of one of the following.
   1. Architect's Supplemental Instruction (ASI).
   2. Change Order
   3. Construction Change Directive.

1.02 ARCHITECT-INITIATED PROPOSALS

A. The Architect will issue a Proposal Request (PR) including a detailed explanation of proposed changes.

B. Proposal Requests are issued only to obtain information. Do not execute the proposed changes.

C. Within 15 days after receiving a Proposal Request, respond with the following information.
   1. List of materials required, unit costs, and total costs.
   2. Taxes, delivery charges, rental, trade discounts.
   3. Effect of the change on the Contract Sum, the Contract Time, and other contractors.
   4. Response to other information requested.

1.03 CONTRACTOR-INITIATED PROPOSALS

A. Propose changes by submitting a written request with the following information.
   1. Description of proposed changes.
   2. Reason for making changes.
   3. List of materials required, unit costs, and total costs.
   4. Taxes, delivery charges, rental, trade discounts.
   5. Effect of the change on the Contract Sum, the Contract Time, and other contractors.
   6. Response to other information requested.

1.04 IMPLEMENTATION OF CHANGES

A. Changes in the Work will be initiated by ASI, Change Order, or Construction Change Directive only.

B. The Architect will direct minor changes in the Work not involving an adjustment to Contract Sum or Contract Time by ASI.

C. Maintain detailed records of work done on Time and Material Force Account basis. Furnish full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-2900 - PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SCHEDULE OF VALUES

A. Submit a typed Schedule of Values within 14 days after execution of the Contract.
B. Use AIA G702 - Application and Certification for Payment, and G703 - Continuation Sheet.
C. Use the Project Manual Table of Contents to organize information.
D. Identify each line item with a Specification Section number and title.
E. For each line item, state separately the amounts for labor, materials, site mobilization, bonds, and insurance.

1.02 APPLICATION FOR PAYMENT

A. Use AIA G702 - Application and Certification for Payment, and G703 - Continuation Sheet.
B. Complete forms by typing or by computer-driven printer, except for signatures.
C. Use data on accepted Schedule of Values. Show dollar value in each column for each line item for portion of the Work performed and for stored products.
D. Include Change Orders, showing Changer Order number and dollar amount as for an original item of Work.
E. Submit lien waivers from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1.03 SUBMITTAL PROCEDURES

A. Submit 4 original copies of each Request for Payment.

1.04 SUBSTANTIATING DATA

A. Submit additional data justifying line item amounts in question when requested.
B. Update Record Documents to reflect all changes resulting from selection of Alternates prior to submitting first application for payment.
C. With each application for payment submit:
    1. Schedule of Values showing Change Orders.
    2. Updated construction schedule.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic document submittal service.
B. Preconstruction meeting.
C. Progress meetings.
D. Number of copies of submittals.
E. Requests for Interpretation (RFI) procedures.
F. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01-2600 - Contract Modification Procedures.
B. Section 01-2900 - Payment Procedures.
C. Section 01-3300 - Submittal Procedures.
D. Section 01-6000 - Product Requirements: General product requirements.
E. Section 01-7300 - Execution.
F. Section 01-7700 - Closeout Procedurs.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
    1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
    2. Contractor and Architect are required to use this service.
    3. It is Contractor's responsibility to submit documents in allowable format.
    4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
    5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
    6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
    7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
B. Submittal Service: The selected service is:
    1. Newforma ConstructEx: www.newforma.com/our-solutions/constructex
    2. Access to Newforma, and information about how it works, are available through the "INFO EXCHANGE" tab at the bottom of the home page, www.BWBR.com
C. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 MEETINGS, GENERAL

A. Notification:
    1. Notify those required to attend meetings at least 72 hours before the first meeting, and before each change in Schedule.

2. Those required to attend meetings shall be familiar with the Project, and shall be authorized to conclude matters relating to the Work.

B. Meeting Minutes:
1. Record meeting minutes, including significant discussions, resolved items, and unresolved items.
2. At each meeting, review minutes of previous meeting; correct if required.
3. Distribute meeting minutes to the Owner, the Architect, attendees, and other concerned entities within 3 days after the meeting.

3.03 PRECONSTRUCTION MEETING

A. Schedule a pre-construction meeting at a convenient location no later than 15 days after execution of the Agreement, and before beginning construction activities. Direct the meeting, and review responsibilities and personnel assignments.

B. Attendees shall include the Owner, the Architect, and their consultants; the Contractor and major subcontractors, manufacturers, and suppliers; and other contractors affected by the Project. Other interested parties may attend.

C. Discuss items of significance that could affect progress, including the following:
1. Tentative constuction schedule, critical sequencing, and working hours.
2. Designation of responsible personnel.
3. Procedures for processing field decisions and Change Orders.
4. Procedures for processing Applications for Payment.
5. Distribution of Contract Documents and preparation of Record Documents.
6. Submittal of Shop Drawings, Product Data, and Samples.
7. Use of the premises and temporary facilities; office, work, and storage areas.
8. Equipment deliveries and priorities.
9. Security.
10. Housekeeping.

3.04 PRE-INSTALLATION MEETINGS

A. Conduct pre-installation meetings at the Site before each major construction activity.

B. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination with other materials, shall attend the meeting.

C. Required pre-installation meetings are identified in Part 1 of the individual technical specification Sections for Work in Divisions 02 thru 33.

3.05 PROGRESS MEETINGS

A. Conduct progress meetings at the Site at regular scheduled intervals. Coordinate meeting dates with Payment Application requests.

B. The Owner, the Architect, Construction Manager, and each Subcontractor, supplier, or other entity concerned with current or future activities shall be represented.

C. Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Secure committments from involved parties to bring delayed construction up to schedule.

D. Review the present and future needs of each entity present.

E. Include a brief summary of progress since the previous meeting in the meeting report.

F. Revise the construction schedule and issue the revised construction schedule with the meeting report.

3.06 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01-6000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

E. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule.
   2. Comply with the following schedule:
      a. List of Subcontractors: 10 days after Notice to Proceed.
      b. List of Materials: 10 days after Notice to Proceed.
      c. Samples: With related submittals or as indicated in the Specifications.
      d. Certificates: With related submittals or as indicated in the Specifications.
      e. Reports: 3 days after receipt.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction, in chronological order.
   4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, role and name of subcontractor, and scheduled date for Architect's final release or approval.
   5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. Allow for two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly indicate when processing must be delayed for coordination.
      b. Process intermediate submittals at the same time as initial submittals.
      c. Allow two (2) weeks for processing each submittal.
      d. No extension of contract time will be authorized because of failure to transmit submittals sufficently in advance of the Work to permit processing.

3.08 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for Record Documents purposes described in 01-7700 - Closeout Procedures.

3.09 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   3. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Upload submittals in electronic form to Electronic Document Submittal Service website.
   4. Schedule submittals to expedite the Project, and coordinate submission of related items.
   5. Submittals not requested or illegible will be recognized, and will be returned "Not Reviewed",

END OF SECTION

SECTION 01-3119 - PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for project meetings.
   1. Pre-construction meeting.
   2. Pre-installation meetings.
   3. Coordination meetings.
   4. Progress meetings.

1.02 NOTIFICATION

A. Notify those required to attend meetings at least 72 hours before the first meeting, and before each change in schedule.

B. Those required to attend meetings shall be familiar with the Project, and shall be authorized to concluded matters relating to the Work.

1.03 MEETING MINUTES

A. Record meeting minutes, including significant discussions, agreements, and disagreements.

B. At each meeting, review minutes of previous meeting; correct if required.

C. Distribute meeting minutes to the Owner, the Architect, attendees, and other concerned entities within 3 days after the meeting.

1.04 PRE-CONSTRUCTION MEETING

A. Schedule a pre-construction meeting at a convenient location no later than 15 days after execution of the Agreement, and before beginning construction activities. Direct the meeting, and review responsibilities and personnel assignments.

B. Attendees shall include the Owner, the Architect, and their consultants; the Contractor and major subcontractors, manufacturers, and suppliers; and other contractors affected by the Project. Other interested parties may attend.

C. Discuss items of significance that could affect progress, including the following.
   1. Tentative construction schedule, critical sequencing, and working hours.
   2. Designation of responsible personnel.
   3. Procedures for processing field decisions and Change Orders.
   4. Procedures for processing Applications for Payment.
   5. Distribution of Contract Documents and preparation of Record Documents.
   6. Submittal of Shop Drawings, Product Data, and Samples.
   7. Use of the premises and temporary facilities; office, work, and storage areas.
   8. Equipment deliveries and priorities.
   9. Security.
   10. Housekeeping.

1.05 PRE-INSTALLATION MEETINGS

A. Conduct pre-installation meetings at the site before each major construction activity.

B. The installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination with other materials, shall attend the meeting.

1.06 COORDINATION MEETINGS

A. Conduct coordination meetings at regular intervals.

B. Request representation by each party currently involved in coordination or planning for the construction activities involved.

1.07 PROGRESS MEETINGS

A. Conduct progress meetings at the site at regularly scheduled intervals. Coordinate meeting dates with payment requests.

B. The Owner, the Architect, and each Subcontractor, supplier, or other entity concerned with current or future activities shall be represented.
C. Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Secure commitments from involved parties to bring delayed construction up to schedule.
D. Review the present and future needs of each entity present.
E. Include a brief summary of progress since the previous meeting in the meeting report.
F. Revise the construction schedule and issue the revised schedule with the meeting report.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-3300 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic submittal process.

B. Submittal requirements for:

1. List of subcontractors.
2. List of materials.
3. Submittal schedule.
4. Product Data, Samples, Shop Drawings, and instructions.
5. Certificates, reports, and other information.

C. Other submittal requirements are found in the following Sections.

1. Section 01-1100 - Summary of Work: Construction schedule.
2. Section 01-2500 -Substitution Procedures.
3. Section 01-2600 - Contract Modification Procedures.
4. Section 01-2900 - Payment Procedures: Schedule of Values, Application for Payment.
5. Section 01-7700 - Closeout Procedures: Record Documents, operation and maintenance manuals.

D. Unique submittal requirements are specified in individual Specifications sections.

1.02 GENERAL SUBMITTAL REQUIREMENTS

A. For those sections containing an article titled "Submittals", submit each listed item according to procedures specified in this Section.

B. Do not submit hardcopy unless required in the specifications, or unless requested.

C. When available, submit computer-generated PDFs; use scanned PDFs only when computer-generated PDFs are not available.

D. Do not fax submittals without prior approval.

E. Do not submit information that is not requested.

F. Submittals that are, in the Architect's opinion, illegible or difficult to read will be rejected.

1.03 ELECTRONIC SUBMITTAL PROCESS

A. For submittals that do not require physical samples, only electronic submittals will be accepted unless otherwise approved.

B. Electronic submittals and file exchanges will be made through Newforma, an online file management program. BWBR will make Newforma available to the Contractor at no charge.

1.04 SPECIFIC REQUIREMENTS

A. Product Data: Manufacturer's standard literature that describes products, their installation, and their maintenance. Include specifications, installation and assembly instructions and diagrams, operating and maintenance instructions and schedules, parts lists, and name and address of local parts supplier. Where applicable, submit roughing-in diagrams, templates, catalogue cuts, wiring and piping diagrams, test reports, performance charts, and similar items.

B. Shop Drawings: Data prepared specifically for this Project. Standard information that conforms to the description of Product Data is not acceptable. Include fabrication, erection, and installation drawings and recommendations, schedules, custom templates, special wiring and piping diagrams, test reports, concrete design mixes, engineering calculations, and similar information appropriate to the specified products.

C. Samples: Examples of the types indicated. Include, as appropriate for the product, manufactured materials, fabricated work, units for independent inspection and testing, examples of color and texture, pattern swatches or palettes for coordination of visual effect, and similar examples. Approved or selected Samples will be the standards for the remainder of the Work.

D. Manufacturer's instructions: Instructions, specifications that include instructions, recommendations, and other documents related to installation. Include for primary products, and for accessory products.

1.05 SUBMITTAL PROCEDURES

A. Review each submittal to ensure its completeness and accuracy. Deliver each submittal according to the approved submittal schedule.

B. Comply with the following schedule.
   1. List of Subcontractors: 10 days after Notice of Award of Contract.
   2. List of materials: 10 days after Notice of Award of Contract.
   3. Submittal schedule: 15 days after Notice of Award of Contract.
   4. Samples: With related submittals or as indicated in the Specifications.
   5. Certificates: With related submittals or as indicated in the Specifications.
   6. Reports: 3 days after receipt.

C. Coordinate processing of submittals with performance of related construction activities.

D. Coordinate transmittal of different types of submittals for related elements so processing will not be delayed by the need for concurrent review of submittals.

E. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received. Such action shall not be the basis for a delay claim.

F. Use transmittal forms furnished by the Architect. Fill in all spaces; enter "N/A" for items that are not applicable to the submittal.

G. For samples, attach a transmittal form to the front of each submittal. Package for shipping, label as "SAMPLE", and enclose a transmittal form.

H. Include relevant information and requests for data with the transmittal.

I. Record deviations from Contract Document requirements, including minor variations and limitations.

J. Sign each transmittal form to certify that information complies with Contract Document requirements except for noted items.

K. Submittals received from sources other than the Contractor will be returned without action.

1.06 LIST OF SUBCONTRACTORS

A. Submit a complete list of proposed Subcontractors, equipment suppliers, and material suppliers for review and notice of objection by the Construction Manager, the Architect or the Owner.

B. Indicate the relevant Specification Division or Section, and the name, address, telephone number, and e-mail address of contact person for each Subcontractor.

C. Include evidence of Subcontractor's qualifications if required in the Specifications.

1.07 LIST OF MATERIALS

A. Submit a complete list of proposed materials, products, and equipment for approval.

B. Arrange the list in order of Specification sections.

C. List only items conforming to project requirements and brand names and model numbers of products, materials, and equipment specified or approved by Addendum.

D. List manufacturer of each product, and name, address, telephone number, and e-mail address of local supplier.

1.08 SUBMITTAL SCHEDULE

A. After acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals.

B. Allow sufficient time for review, processing, and re-submittal so installation will not be delayed.
   1. Allow 2 weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly indicate when a processing must be delayed for coordination.
   2. Process intermediate submittals the same as initial submittals.
   3. Allow 2 weeks for processing each submittal.
   4. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

C. Prepare the schedule in chronological order. Include submittals required during the first 90 days of the Contract. Furnish the following information.

1. Scheduled date for the first submittal.
2. Related Specifications section number.
3. Submittal category.
4. Name of subcontractor.
5. Description of the part of the Work covered.
6. Scheduled date for re-submittal.
7. Scheduled date for Architect's final release or approval.

D. Following response to initial submittal, distribute copies to the Architect, Owner, subcontractors, and other entities required to comply with submittal dates indicated. Post copies in the Project meeting room and in the field office.

E. Distribute revisions to the same entities and post in the same locations, except delete entities from distribution when they have completed their part of the Work and are no longer involved in construction activities.

F. Revise the schedule after each meeting or activity in which revisions have been recognized or made. Issue the updated schedule with each meeting report.

1.09 PRODUCT DATA

A. Clearly mark each document to identify required information being submitted. Circle or highlight relevant information, or cross out information that does not apply.

1.10 SAMPLES

A. Clearly identify Samples with Project title, Contractor, manufacturer, specification section, product type; color range, texture, and finish; and other identifying data. Send Samples with a letter of transmittal indicating the Contractor's approval, and other supporting information as may be necessary. In addition, submit a PDF version of the transmittal letter.

B. Where color or pattern Samples are required, submit the full range of colors and patterns in the indicated price range for preliminary selection by the Architect. Where no price range is indicated, submit the full range of standard and custom options.

C. After preliminary selection of color or pattern, submit pairs of each selected option to demonstrate the range to be expected in the finished Work.

D. Submit one Sample of each other item required unless otherwise specified. Samples shall not be used in the Work unless otherwise indicated.

E. The Architect will retain approved Samples until final completion. If approved Samples must be returned for fabrication, submit additional Samples as required.

F. Remove Samples when requested.

1.11 SHOP DRAWINGS

A. Submit drawings that illustrate plans, elevations, sections, and construction details in DWG format.

B. Submit other Shop Drawings in PDF format, one PDF per document. Do not fax.

C. Make required corrections, and re-submit for approval. Distribute approved Shop Drawings for record, fabrication, and field distribution. Use only approved Shop Drawings for construction and Record Documents.

D. Electronic files for architectural Drawings will be furnished to the Contractor on request as an aid to preparing Shop Drawings.

1. Only background plan views will be included.
2. Files will be in DWG format.
3. Files will be issued on a CD within 10 days after request from the Contractor.

E. Distribute files to subcontractors and suppliers, and notify them of the conditions of use.

1.12 CERTIFICATES, REPORTS, AND OTHER INFORMATION

A. Submit on industry standard forms, unless otherwise specified or approved.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-3533 - INFECTION CONTROL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for work at the site that are intended to minimize risk of infection or contamination of areas outside the construction limits.

B. Compliance with current applicable guidelines of the Facilities Guidelines Institute (FGI), and additional infection control requirements as directed by the Owner.

1.02 RELATED WORK

A. Section 01-3534 - Work Area Enclosures: Temporary barriers and procedures for interior work.

B. Mechanical: Commissioning requirements.

1.03 DEFINITIONS

A. Owner's Representative: The person appointed by the Owner to oversee those parts of the Work that affect infection control. The name, telephone and fax numbers, and e-mail address for the Owner's Representative will be identified at the Preconstruction Meeting.

B. The Owner's Representative will furnish current policies and requirements at the Preconstruction meeting, and will notify the Contractor of changes in policies and requirements that are made during execution of the Work.

C. References to "the Owner" shall be interpreted as meaning "the Owner's Representative."

1.04 WORKER ORIENTATION

A. All employees of the Contractor, subcontractors, suppliers, and other persons involved in the Work shall attend an orientation meeting before being permitted to work at the site.

B. Orientation meetings will be conducted at times and places in facilities as designated by the Owner.

C. Orientation meetings will last approximately 30 minutes. Subjects will include:

1. Infection control risks, considerations, and policies.
2. Owner's policies.
3. Travel routes for workers, material, and waste.

1.05 QUALITY ASSURANCE

A. Discuss infection control requirements at construction meetings.

B. Post warnings and project information as directed.

C. Follow designated travel routes. Move materials only within times designated by the Owner.

D. Use tightly sealed containers for transporting debris through the building. Clean outside of containers before leaving construction areas.

1.06 COORDINATION

A. Advise the Owner of operations that are affected by infection control requirements.

B. The Owner is responsible for notifying the Owner's department managers, nurse managers, and other staff of status of the Work.

1.07 MECHANICAL EQUIPMENT

A. Use motorized equipment only when necessary. Turn off engines and motors when not required for use.

B. Place internal combustion equipment where directed; obtain approval before operating.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 INTERIOR WORK

A. Do not store material or equipment outside construction barriers.

B. Immediately notify the Owner of water damage. Materials that cannot be dried within 72 hours may require removal or other special action as directed by the Owner.

3.02 EXTERIOR WORK

A. Direct exhaust away from building and building air intakes.

B. Do not transport debris from exterior work through interior of buildings.

3.03 FIELD QUALITY CONTROL

A. The Owner will monitor air quality during execution of the Work.

3.04 CLOSEOUT AND COMMISSIONING

A. The Owner will establish criteria for mechanical systems before acceptance.

B. Within 24 hours before Substantial Completion, turn on all water faucets in construction area and run for two minutes. Turn off faucets when complete.

C. Areas requiring special ventilation may require infection control verification before occupancy. Such areas typically include surgical services, protective environments, airborne infection isolation rooms, laboratories, and local exhaust systems for hazardous agents. Verification may include particle count ranges, environmental culturing, and other procedures and specifications.

END OF SECTION

SECTION 01-3534 - WORK AREA ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Containment enclosures for interior work.

1.02 RELATED WORK

A. Section 01-3533 - Infection Control Procedures: Owner's requirements for infection control.

1.03 COORDINATION

A. Perform work outside of containment enclosures from 6 p.m. to 6 a.m. the following day. Other work times may be approved by the Owner.

B. The Owner may allow openings in ceilings to be contained with a portable enclosure.

C. The Owner will determine when negative air is required, and the air exchange rate required when enclosures are erected or modified.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Framing: Metal, or fire retardant treated lumber.

B. Plastic sheet: Flame resistant.

C. Sheathing: Fire retardant treated lumber or ASTM C36 Type X gypsum board.

D. Tarpaulins: Waterproof, fire resistant, UL labeled; flame spread rating 15.

E. Portable enclosures for work in sterile corridors: Kontrol Kube, by Fiberlock Technologies, Inc., Andover, Massachusetts, 800-342-3755. Include the following:

1. Adjustable Aluminum Frame No. 6440.
2. Vinyl Enclosure No. 6442.
3. Wheel Base Platform No. 6443.
4. Nilfisk 87-cfm vacuum device and manometer.
5. Inspection window and pressure differential porthole.

PART 3 EXECUTION

3.01 ENCLOSURES, GENERAL

A. The Owner will determine when a dust proof enclosure is required to protect adjoining areas. Provide the type of barrier identified by the Owner. Provide negative air equipment when directed.

B. Provide temporary partitions and ceilings to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

C. Where work does not extend above ceilings, enclosures above the ceiling may not be required.

D. If pressure differential problems result from openings in exterior walls, provide an anteroom for pressure management as directed by the Owner.

E. Notify the Owner of possible release of harmful dusts or vapors, flammable or explosive materials, and other potential hazards.

F. Seal open ducts and pipes. When in areas with negative air, verify that pressure differential is maintained. Seal exhaust system ductwork that might leak into building or mechanical systems.

G. Close off and label lines supplying oxygen and other gases to the work area.

H. Enclosures shall be continuous from floor to ceiling and wall to wall, and shall extend from the upper surface of the ceiling to the deck above. Seal joints and perimeter with caulk or duct tape.

I. Keep traffic between enclosed and open areas to a minimum. Keep doors to enclosed areas closed at all times.

3.02 WORK ABOVE CEILINGS

A. Coordinate ceiling access with the Owner. If permitted by the Owner, portable enclosures may be used to enclose ladders to work in ceiling areas. When used, fit tightly to the ceiling.

B. Ceiling access work shall be completed the same day that it is started unless otherwise approved by the Owner.

C. Immediately notify the Owner of problems related to work above ceilings.

D. The Owner will notify nurse managers of the need to keep patient doors closed while work is in progress, and other related requirements.
E. Clean acoustical ceiling components that are dusty or dirty prior to disruption of the panels.
F. Notify the Owner when acoustical ceiling boards with water damage are found. If evidence of mold growth is found, follow abatement methods procedures as directed by the Owner .
G. Work above ceilings may be contained with temporary enclosures constructed of plastic sheet where approved by the Owner. Seal seams and perimeter with duct tape. Repair leaks immediately.

3.03 SOLID WALL CONTAINMENT ENCLOSURES

A. Where solid wall enclosures are required, use drywall sheathing. Seal airtight with joint sealer, tape, and foam padding.
B. Construct solid wall containment enclosures full height, noncombustible construction, tightly sealed top, bottom and all seams to prevent the spread of dust to occupied areas, including above ceiling.
C. Provide solid core wood doors, 36 inches minimum width, with metal frame and hardware, including closer and weatherstrip to for airtight seal. Locate as directed, with swing into construction area.
D. Obtain Owner's approval of location and construction details.
E. Precut enclosure materials in unoccupied areas. Do not use power driven fasteners unless approved by the Owner.

3.04 OTHER INTERIOR WORK

A. Contaminants generated within a single room may be contained by sealing doors and other openings with duct tape at head, jamb, and sill.
B. Enclose work that involves demolition of walls, floors, or ceilings with sheathing on the construction side of the framing.
C. Use window exhaust systems to maintain negative pressure in contaminant producing work areas. The Owner may conduct periodic smoke stick airflow evaluations for verification.
D. Do not open windows in work area except when an exhaust fan is used. Close windows at end of each work shift.
E. Damp mop hard surface floors in work area daily to minimize tracking of contaminants from work area.
F. Protect carpet with plastic and plywood.
G. Provide hard surfaced area at entrances for daily damp mopping.

3.05 NEGATIVE AIR

A. HEPA filters are required for solid wall barriers in high-risk areas as identified by the Owner.
B. Provide negative pressure in construction area by balancing supply ventilation, or with negative air machines. Do not recirculate air from construction area to remainder of hospital unless approved by the Owner.
C. Operate negative air machines continuously. Connect to emergency backup power source.
D. Maintain airflow at a measurable pressure differential from clean to dirty.
E. Monitor air quality during all phases of the Work. Use visible monitoring, flutter strips, smoke-testing, or other reliable methods. Stop work and notify the Owner if air quality standards are compromised.

3.06 DUST AND DIRT CONTROL

A. Limit dust and dirt dispersal to lowest practicable level.
B. Use water sprinkling for cutting and hammering operations. Control water to prevent hazardous conditions, flooding, or spread of pollutants.
C. Use tools with dust collecting hoods connected to a vacuum collection system. Filter exhaust air with HEPA filter; discharge exhaust outside of building.
D. If contaminants escape into protected areas, cease work and repair containment enclosures.
E. Provide walk-off mats at entrances and exits to the construction area. Change and clean mats and carpet as often as necessary to minimize contamination to other areas.
F. Remove dust tracked outside of construction area.

3.07 TERMINATION AND REMOVAL

A. At Substantial Completion, clean and renovate permanent services and facilities that have been used during construction.
   1. Replace air filters and clean inside of ductwork and housings.
   2. Replace worn parts and parts that have been subject to unusual operating conditions.
   3. Replace lamps that are burned out or noticeably dimmed.
   4. Clean and adjust plumbing fixtures.

B. Coordinate removal of containment enclosures with the Owner.

C. Thoroughly clean construction area after removal of containment enclosures.

END OF SECTION

SECTION 01-3538 - CONTAMINANT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Special procedures to limit airborne contaminants that might affect occupants, sensitive procedures, or equipment.

B. Report release of contaminants outside of containment areas to the Owner immediately.

1.02 DEFINITIONS

A. *contaminant*: A material that may be dispersed through normal air movement, such as dust, fibers, aerosols, fumes, and similar materials.

1.03 SUBMITTALS

A. Travel routes for personnel, material, and waste.

1.04 QUALITY ASSURANCE

A. Conduct a pre-construction meeting with subcontractors, and Owner's staff.

B. Post warnings and project information as directed.

C. Place internal combustion equipment where directed; obtain approval before operating.

D. Obtain approval before performing operations that generate contaminants that might be drawn into building air intakes.

E. Before beginning excavation or exterior demolition, verify proper installation and operation of building air intake filters.

F. The Owner will designate travel routes through the building, for personnel, for transporting materials, and for transporting waste.

G. When debris must be transported through the building, use closed containers. Clean containers before leaving construction areas.

1.05 COORDINATION

A. Advise the Owner and the Architect of operations that might affect persons in adjacent or nearby areas by generation of contaminants. Obtain approval before beginning such operations.

B. Use motorized equipment only when necessary. Turn off engines and motors when not required for use.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXTERIOR WORK

A. Seal outside of windows near exterior work areas to prevent infiltration.

B. Direct exhaust away from building and building air intakes.

C. Do not transport debris from exterior work through interior of buildings.

3.02 INTERIOR WORK

A. Contaminants generated within a single room may be contained by sealing doors and other openings with duct tape at head, jamb, and sill.

B. Enclose work that involves demolition of walls, floors, or ceilings with sheathing on the construction side of the framing. Enclosures shall be continuous from floor to ceiling and wall to wall, and shall extend from the upper surface of the ceiling to the deck above. Seal joints and perimeter with caulk or duct tape.

C. Work above ceilings may be contained with temporary enclosures constructed of plastic sheet where approved by the Facility Project Manager. Seal seams and perimeter with duct tape. Repair leaks immediately.

3.03 MECHANICAL SYSTEMS

A. Seal ducts and pipes that are open, or that might leak into building or mechanical systems.

B. Seal return air ducts.

C. Remove seals just prior to Substantial Completion.

D. Close off and label lines supplying oxygen to the work area.

3.04 CONTAINMENT

A. Use window exhaust systems to maintain negative pressure in contaminant producing work areas. The Owner may conduct periodic smoke stick airflow evaluations for verification.

B. Do not open windows in work area except when positive exhaust is used. Close windows at end of each work shift.

C. Damp mop hard surface floors in work area daily to minimize tracking of contaminants from work area.

D. Protect carpet with plastic and plywood.

E. Provide hard surfaced area at entrances for daily damp mopping.

F. If contaminants escape into protected areas, cease work and repair leaks.

END OF SECTION

SECTION 01-4023 - DEFINITIONS AND QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for compliance with governing codes, regulations, and standards.

B. Determine the extent to which codes, regulations, and standards apply to the Work, and comply with applicable requirements.

1.02 DEFINITIONS

A. The following definitions apply to Specifications sections and to Contract Modifications.

1. *furnish*: Supply and deliver to the work site, ready for unloading and installation.
2. *install*: Unload, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, connect to required services, store and protect, and similar operations required to put a product in place where indicated and make it functional.
3. *provide*: Furnish and install completely, ready for intended use.
4. *directed, requested, authorized, selected, approved*: These and similar terms mean directed by the Architect, requested by the Architect, and similar phrases unless followed by the name of another identity, such as the Owner, the Contractor, or the Construction Manager. These terms shall not be interpreted to extend the Architect's responsibility to the Contractor's or Construction Manager's area of construction supervision.
5. *finish*: All visual aspects, including color, sheen, texture, and pattern.
6. *include, includes, including*: These terms are not restrictive; they do not define the total extent of items or exclude items not listed.
7. *indicated*: Refers to graphic representations, notes, schedules, or written requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help locate the reference; but no limitation on location is intended except as specifically noted.
8. *installer*: The entity responsible for installing a particular product or system. Installers shall be experienced in the operations they are engaged to perform.
9. *regulations*: All laws, statutes, ordinances, codes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control execution of the Work.
10. See the General Conditions for definition of Product Data, Samples, Shop Drawings, the Project and the Work.

1.03 SUBMITTALS

A. Within 10 days after receipt, submit to the Architect copies of permits, licenses, certifications, inspection reports, releases, settlements, notices, receipts for fee payments, and similar documents related to compliance with regulations.

1.04 QUALITY ASSURANCE

A. The Work shall be governed by and conform to the requirements of applicable regulations. These regulations are a part of the Contract Documents, and have full force and effect as if they were bound into the Contract Documents.

B. The Work shall conform to the requirements of applicable industry standards. These standards are a part of the Contract Documents, and have full force and effect as if they were bound into the Contract Documents.

C. Comply with regulations and standards in effect on the date of the Bidding Documents, except where a specific date or edition is indicated.

D. Where regulations or standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirements shall apply. Refer requirements that are different, but apparently equal, and uncertainties about which quality level is more stringent, to the Architect for a decision before proceeding.

E. The quantity or quality level indicated is the minimum to be provided or performed. Tolerances shall equal or be superior to those indicated. Refer instances of uncertainty to the Architect for a decision before proceeding.

F. Each entity performing a part of the Work shall be familiar with those standards and regulations applicable to that entity's construction activity.

1.05 SPECIFICATION FORMAT AND CONTENT

A. A colon (:) shall be interpreted as "shall", "shall be", "shall have", or "shall comply with" depending on the context of the phrase.

B. Singular terms shall be interpreted as plural and plural terms interpreted as singular as the full context of the Contract Documents indicates.

C. The Specifications are directions for the Contractor. Unless another entity is named as responsible for a given action, the Contractor is responsible for all requirements of the Contract Documents.

1.06 ASSIGNMENT OF SPECIALISTS

A. The Specifications require that some activities be performed by specialists in those activities. Specialists shall perform those activities, but the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

B. This requirement shall not be interpreted to conflict with enforcement of regulations or to interfere with local trade union jurisdictional settlements and similar conventions.

1.07 REFERENCE STANDARDS

A. Names of trade associations, government agencies, other specification producing organizations, and regulation titles are frequently abbreviated by use of their common acronyms.

B. If the full name of an acronym is not known, request definition from the Architect.

C. Reference standards are identified by the acronym of the issuing body and the identifying publication number.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-4500 - QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inspections, tests, and related activities performed by the Contractor, by testing agencies, and by governing authorities.

B. Quality control does not include contract enforcement activities performed by the Architect.

1.02 OWNER RESPONSIBILITY

A. The Owner will employ an independent testing agency (ITA) to perform inspection and testing in accordance with Chapter 17 of the IBC, as adopted and modified by the State of North Dakota.

B. The Owner's ITA will also perform other inspection and testing indicated, unless specified as the responsibility of the Contractor.

1.03 ITA RESPONSIBILITY

A. The ITA will cooperate with the Construction Manager, the Architect, the Contractor, and will perform the following services.

1. Notify the Construction Manager, the Architect, and the Contractor promptly of irregularities observed during performance of service.
2. Prepare and submit reports to the Architect and the Contractor.
3. Help verify quantities of materials for measurement and payment.

B. The ITA will not:

1. Modify the requirements of the Contract Documents.
2. Perform Contractor's work.

1.04 CONTRACTOR RESPONSIBILITY

A. Cooperate with the ITA. Provide access, incidental labor, and facilities required to assist testing and monitoring, and take samples as requested.

B. Notify the Construction Manager, the Architect, and the ITA at least 72 hours before the time services will be required.

C. When specified, require suppliers or manufacturers to furnish qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment; to test, adjust, and balance of equipment as applicable; and to instruct the Owner as indicated. The cost of such assistance shall be included in the Contract Sum.

D. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

E. Monitor quality control of products, services, and workmanship.

F. Monitor tolerances of installed products. Do not permit tolerances to accumulate.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities: Light, power, heat, ventilation, telephone service, water, sanitary facilities.

B. Temporary controls: Barriers, enclosures, protection, water control, security.

C. Construction facilities: Parking, progress cleaning, temporary buildings.

1.02 RELATED WORK

A. Section 01-3533 - Infection Control Procedures: Owner requirements to control infection.

B. Section 01-3534 - Work Area Enclosures: Temporary barriers and procedures for interior work.

C. Section 01-3538 - Contaminant Control: Special procedures to limit airborne contaminants.

1.03 STANDARDS

A. Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Comply with applicable codes and regulations for temporary construction. Minimum requirements are specified.

1.04 CONDITIONS OF USE

A. Careless or wasteful use of Owner-furnished facilities or service may result in termination of use. If terminated for cause, provide replacement facilities or service at no cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS - MINIMUM REQUIREMENTS

A. Framing: Contractor's choice.
   1. Steel.
   2. Fire retardant treated lumber.
   3. Prefabricated containment system; lightweight aluminum frame with fiberglass reinforced polymer partitions that exceed ICRA Class IV requirements.
      a. STARC Systems; LiteBarrier and/or RealWall
      b. Others as approved.

B. Plastic sheet: Flame resistant.

C. Sheathing: Contractor's choice.
   1. Fire retardant treated plywood.
   2. ASTM C1396 Type X gypsum board.

D. Tarpaulins: Waterproof, fire resistant, UL labeled; flame spread rating 15.

E. Fence: Commercial grade chain link, minimum 6 feet tall, with gates and locks.

PART 3 EXECUTION

3.01 ELECTRIC POWER AND LIGHT

A. The Owner will furnish electricity from designated points of service at no charge.

B. Provide branch wiring from power source to distribution boxes. Minimum requirements:
   1. One 20 amp, single phase circuit per 200 square feet of active work area.
   2. One 20 amp, single phase branch circuits for lighting.
   3. Polarized, grounded receptacles.
   4. Overcurrent and ground fault protection.

C. Provide temporary lighting for safe work and traffic conditions in area of work, including exterior staging and storage areas for security. Protect lamps with guard cages or tempered glass enclosures.

D. Permanent power and light systems may be used when operable.

3.02 WATER SERVICE

A. The Owner will furnish water from designated points of service at no charge. Provide a backflow prevention device to isolate construction water distribution from existing water supply.

B. Provide water distribution equipment required for the Work. Connect to existing service where directed.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation as required to prevent freezing.

3.03 SANITATION

A. Provide and maintain temporary toilet facilities.

B. Maintain site in a clean and orderly condition. Remove waste materials, debris, and rubbish from site weekly and legally dispose of off-site. Comply with NFPA 241 and regulations for removal of combustible waste.

C. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

D. Do not use open free-fall chutes. Terminate closed chutes in appropriate containers with lids.

3.04 FIELD OFFICE

A. Provide a weathertight field office with lighting, electrical outlets, heating, cooling, and ventilation. Provide space for project meetings, with table and chairs for 12 persons. Install where directed.

3.05 TELEPHONE SERVICE

A. Provide telephone, internet service and fax service, with answering machine or 24-hour answering service.

3.06 HEATING AND COOLING

A. Maintain temperature between 50 and 80 degrees F in enclosed portions of the structures and areas where finished work has been installed, except where other temperature is specified.

B. Permanent heating systems, except for air-handling systems, may be used when operable. Pay all costs associated with extending, using, and restoring permanent systems. Verify that systems are approved for operation, equipment is lubricated, and filters are in place. Pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Provide filtration at each return air grille, complying with ASHRAE 52.2, MERV 8.

3.07 BARRICADES, WARNING SIGNS, AND SECURITY

A. Provide barricades, covered walkways, warning and directional signs, and lights required for life safety and protection of property as required by regulation and the nature of the Work. Coordinate with Owner's security program.

B. Where products must be stored temporarily, provide a secure lockup. Each contractor is responsible for the security of their tools and materials.

C. Provide security and facilities to protect the Work, existing facilities within or accessible from the Work; and Owner's operations from unauthorized entry, vandalism, or theft. Coordinate with Owner's security program.

3.08 ROADS, PARKING, AND TRAFFIC CONTROL

A. Parking is available at the site.

B. Maintain access to fire hydrants.

C. Remove mud from vehicle wheels before entering streets as required by local authorities.

3.09 FIRE PROTECTION

A. Provide portable fire extinguishers as required by governing regulations.

B. Develop and supervise an overall fire prevention and first-aid fire protection program for personnel at the site. Instruct personnel in methods and procedures to be followed.

C. Maintain unobstructed access to firefighting equipment, stairways, and access routes for fighting fires.

3.10 PLANT PROTECTION

A. Protect plants to remain from damage. Do not use plants that are to remain for crane stays, guy anchors, or other fastenings. Do not light fires, store materials, pile debris, or park motorized equipment within the spread of branches.

3.11 PROTECTION OF INSTALLED WORK

A. Protect existing and installed Work.

B. Provide durable sheet materials for protection of finished floors, stairs, and other surfaces.

C. Prohibit traffic or storage on waterproofing, roofing, and landscaped areas.

3.12 OPERATION, TERMINATION, AND REMOVAL

A. Do not permit temporary installations to be abused or endangered. Do not allow hazardous or unsanitary conditions.

B. Maintain construction facilities and temporary controls in good operating condition.

C. Remove temporary seals from doors, windows, other openings, ductwork, and pipes.

D. Remove each temporary service and facility when no longer needed, when it has been replaced by the authorized use of a permanent facility, or when directed, but no later than Substantial Completion.

E. Remove temporary underground installations to a minimum depth of 2 feet.

F. At Substantial Completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during construction.

1. Replace air filters and clean inside of ductwork and housings.
2. Replace worn parts and all parts that have been subject to unusual operating conditions.
3. Replace lamps that are burned out or noticeably dimmed.
4. Clean and adjust plumbing fixtures.
5. Flush water lines until clear during reinstitution of service.

END OF SECTION

SECTION 01-6100 - COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selection of products by the Contractor.

B. General requirements for packing, delivery, and acceptance at the site.

C. General requirements for storage and handling.

1.02 QUALITY ASSURANCE

A. Manufactured products shall be designed, fabricated, and assembled in accordance with prevailing practices, unless a higher level of quality is indicated.

B. Manufacturers shall have a well-established local representative. Replacement parts and repair service facilities for equipment shall be locally available.

C. Work shall be performed by competent and qualified mechanics, skilled in the required trade. Incompetent, careless, or poorly executed work will be rejected.

1.03 PACKING, DELIVERY, AND ACCEPTANCE

A. Products shall be packed in protective materials before shipment from the factory.

B. Identifying labels shall be printed on, or affixed to, packaging before shipment from the factory. Labels shall include manufacturer's name and location, product brand name and type, date of manufacture, and directions for storage. Labels for materials that are field-mixed shall include mixing instructions, shelf life, and pot life.

C. The type and extent of packing used is the manufacturer's responsibility. No allowance will be made for products damaged in transit.

D. Control delivery schedules to minimize long-term storage at the site and overcrowding of construction space. Minimize storage time for products that are flammable, hazardous, easily damaged, or sensitive to deterioration or theft.

E. Products shall be delivered in the manufacturer's original packaging, with identifying labels intact and legible.

F. Do not deliver wood, carpet, fabrics, and other absorptive or moisture-sensitive material until on-site interior storage area is enclosed and conditioned to temperature and humidity recommended by manufacturer.

G. Inspect products when delivered. Immediately make arrangements to replace missing, damaged, or defective items.

1.04 STORAGE

A. Store as recommended by the manufacturer, except where more stringent requirements are specified.

B. Use weathertight enclosures to store products and containers subject to damage by weather. Maintain temperature and humidity within limits specified by manufacturer. Ventilate to prevent condensation. Protect from direct sunlight.

C. Protect products containing wood from water in any form.

D. Store aggregates, loose granular materials, and similar materials on impervious surfaces. Prevent contamination. Store other products 4 inches above the floor or ground on blocking or skids. Protect from soiling and from staining.

E. Store liquids in tightly sealed containers.

F. For work on roof, verify structural capacity. Distribute material stored on roof so capacity is not exceeded, and so permanent deflection occurs.

1.05 HANDLING

A. Handle products as recommended by the manufacturer, except where more stringent requirements are specified.

B. Lift only at points designated by the manufacturer. Where no lift points are indicated, examine contents and lift where least likely to damage products.

C. Use wide straps to clamp or lift collapsible packaging.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Wrap or package each type of component separately to protect contents during storage.

B. Mark with project title and date, building name and room number.

C. At Substantial Completion, deliver to site where directed.

PART 2 PRODUCTS

2.01 GENERAL

A. Standards: Specific products or manufacturers identified in a paragraph beginning "Basis of design" or "Standard: Design is based on..." are the basis for design and related details. Products used, whether by manufacturers listed as acceptable, or approved by modification of the Contract Documents, shall be of equal or better quality, performance, construction, and appearance.

B. Acceptable Manufacturers: Companies believed to be capable of producing the specified products. Products of acceptable manufacturers are not automatically approved, but must comply with the Contract Documents.

C. Suitability: Do not use products for purposes other than those for which designed.

D. Quality: Unless otherwise indicated, products incorporated in the Work shall be new, undamaged, of good commercial quality, suitable for conditions of service, and shall comply with the Contract Documents and applicable standards and regulations.

E. Consistency: Similar products shall be from the same manufacturer unless otherwise indicated or approved. Two or more items of the same kind shall be identical. Like parts of each product type and model shall be interchangeable.

F. Compatibility: Products shall be compatible with adjacent, interconnecting, and dependent products, with substrates, and with products applied later. Where selection from two or more products is permitted, products selected shall be compatible with other products used.

G. Accessories: Provide clips, brackets, screws, anchors, and other products required for proper installation.

2.02 PRODUCT/MANUFACTURER IDENTIFICATION

A. Equipment Nameplates: Each piece of equipment shall bear a permanent nameplate.

1. The label shall contain the manufacturer's name, model designation, serial number, capacity, speed, ratings, and other operating data.
2. Nameplates shall be located on an easily accessible surface that is inconspicuous when the equipment is in an occupied space.

B. Labels: Except for required labels and operating data, manufacturer's nameplates and trademarks shall not be exposed to normal view when installation is complete.

1. Labels or stamps that are required to be visible after installation shall be applied in an inconspicuous location.
2. Other required labels and stamps shall be located on concealed surfaces.

C. Protection: Do not paint, deface, or conceal required nameplates or labels.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01-7300 - EXECUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acceptance of conditions.

B. General requirements for installation.

C. General requirements for cleaning and protection.

1.02 QUALITY ASSURANCE

A. Comply with ANSI A10.6 - Safety Requirements for Construction and Demolition.

1.03 FIELD CONDITIONS

A. Maintain temperature and humidity in installation areas within range specified by manufacturer minimum 48 hours before beginning installation, or greater as recommended by manufacturer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Inspect the substrate and conditions of installation. Do not begin or continue installation until unsatisfactory conditions have been corrected, unless otherwise directed.

B. Inspect materials immediately before installation. Reject items that are damaged or defective.

C. Beginning installation shall be construed as acceptance of conditions and substrates.

3.02 GENERAL INSTALLATION PROVISIONS

A. Install, protect, lubricate, adjust, and protect products according to the manufacturer's instructions.

B. Where other requirements are specified, are required by regulation, or are accepted practice of the industry or trade, comply with the most stringent provisions.

3.03 INSTALLATION

A. Provide attachment and connection products necessary for securing work. Install and secure work true to line, with vertical edges plumb, and horizontal edges level.

B. Install exposed work with uniform joint widths. Arrange joints for best visual effect. Where new work abuts or is adjacent to existing, match existing joint width and pattern unless otherwise indicated. Verify measurements and dimensions before starting each installation.

C. Install materials under conditions most favorable to proper performance.

D. Isolate incompatible materials to prevent deterioration and damage.

E. Mount components at standard mounting heights recognized within the industry for each component except where other height is indicated or required by regulation.

3.04 CLEANING AND PROTECTION

A. Clean and protect work in progress and adjoining materials in place. Install protective covering where required to prevent damage.

B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Protect each part of the Work from harmful exposure before Substantial Completion.

D. Prevent unnecessary operation of equipment.

END OF SECTION

SECTION 01-7329 - CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cutting and patching required to complete the Work, and to make new work tie in with existing to maintain weather tightness, performance, and appearance.

1.02 RESPONSIBILITY

A. The Contractor is responsible for all cutting and patching required by this Contract.

1.03 SUBMITTALS

A. Description of procedures, extent, and methods for cutting and patching. Indicate changes to structural and operating components, and changes to appearance of completed work.

B. List of utilities that will be affected, including those that will be relocated, and those that will be temporarily disconnected. Indicate dates of disruption and reconnection.

C. List of products that will be used for patching.

D. Details and engineering calculations for work involving alteration of structural members.

E. Certification that cutting and patching work performed on existing warranted products or assemblies does not void warranties, by entity that issued original warranty.

1.04 QUALITY ASSURANCE

A. Verify location of reinforcing in concrete members before cutting or drilling. Do not cut, expose, or damage reinforcing except as directed. Cut thin part of concrete members.

B. Perform work in a manner that will show minimal evidence of cutting and patching when complete.

C. Do not cut the following without the Architect approval:

1. Structural components, stair systems or equipment supports.
2. Curtain wall construction.
3. Operational or control systems, piping, ductwork, or vessels; communications, conveying, or wiring systems.

D. Repair disruptions of fire, smoke, and sound barriers to restore performance and ratings.

E. The Architect will conduct a final review of cut and patched work for visual quality. Remove and replace patches judged to be visually or functionally unsatisfactory at no additional cost to the Owner.

F. Repair roofing and other products or assemblies that are still under warranty as directed by the manufacturer to maintain existing warranties. Employ approved installers if required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use materials identical to existing materials where practicable. If existing materials are no longer available, or cannot be used, use compatible materials that match existing as closely as possible.

B. Do not use asbestos containing materials, lead paint, or other materials that contain hazardous substances.

C. Repair products or systems that are under warranty with products manufactured or approved by the product manufacturer or installer to maintain warranties.

D. Patch fireproofing, firestop, and rated assemblies to maintain the existing rating. Verify with manufacturers of existing products.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide temporary support. Protect existing construction to prevent damage. Provide protection from weather for materials that will be exposed.

B. Do not cut existing pipe, ductwork, conduit, or wire until provisions have been made to bypass them.

3.02 PERFORMANCE

A. Use cutting methods least likely to damage elements that are to remain or be reused. Use hand tools or small power tools designed for cutting or grinding; avoid use of hammering or chopping tools.

B. Cut holes neatly to smallest practicable size; minimize disturbance of surrounding surfaces. Provide covers for holes when not being used.

C. Limit dust and dirt dispersal to lowest practicable level. Notify the Architect of possible release of or exposure to harmful dusts and vapors, flammable or explosive materials, and other potential hazards.

D. Provide local exhaust system to capture dust and dirt.

E. Inspect and test patched areas to verify integrity of installation. Restore exposed finishes and extend finish restoration to minimize evidence of patching and refinishing.

END OF SECTION

SECTION 01-7700 - CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative procedures for Substantial Completion and final completion of the Work.

B. Final site review.

1.02 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, the Work has been inspected, and that the Work is complete in accordance with the Contract Documents and ready for Substantial Completion inspection.

B. Furnish submittals required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and remaining amount due. Include final lien waivers from each entity involved in performance of the Work.

1.03 FINAL CLEANING

A. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

B. Clean equipment and fixtures with cleaning materials appropriate to the material being cleaned.

C. Remove debris from drainage systems.

D. Clean areas of the site used for construction. Sweep paved areas, rake landscaped surfaces clean.

E. Remove waste and surplus materials and rubbish.

F. Vacuum clean casework interiors.

1.04 ADJUSTING

A. Adjust operating products and equipment to ensure smooth, correct, and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following documents to record revisions to the Work.

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Product Data, Samples, and Shop Drawings.
6. Manufacturer's instructions and recommendations for assembly, installation, and adjusting.
7. Material safety data sheets (MSDS) for each product installed or used at the site.
8. Signed copy of building permit and other required permits.
9. Inspection sign-off card.

B. Ensure entries are complete and accurate to enable easy reference by the Owner and facility managers.

C. Store Record Documents separate from documents used for construction.

D. Legibly mark Record Documents to record information as construction progresses.

E. Specifications: Record products used, including:

1. Manufacturer's name, product models and numbers.
2. Product alternates or substitutions used.
3. Changes made by addenda and contract modifications.

F. Drawings and Shop Drawings: Record final locations and dimensions, including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Drawings.

G. Submit documents with final Application for Payment.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit 3 copies of data bound in 3-ring binders with durable plastic covers. Use standard binders, no larger than 11-1/2 inches tall by 12 inches deep by 3 inches wide.

B. Prepare binder covers with printed title "Operation and Maintenance Instructions" and project title. Include subject matter of binder when multiple binders are used.

C. Divide binder contents with tabbed page dividers. Tabs shall extend beyond the edge of document pages, and have plastic covers to protect labels. Clearly label each tab with the title of the content that follows.

D. Include a comprehensive table of contents at the beginning of each volume, identifying each product or system. When more than one volume is used, indicate the contents of all volumes in each table of contents.

E. Print contents on 24 pound white paper.

F. Divide into three parts.

1. Part 1: Directory. List names, addresses, and telephone numbers of the Architect, Contractor, subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, list names, addresses, and telephone numbers of subcontractors and suppliers. Include the following:
    a. Significant design criteria.
    b. Company name, address, telephone number, and e-mail address for each source of parts and service.
    c. Equipment list.
    d. Parts list for each component.
    e. Operating instructions.
    f. Diagrams for wiring, piping, and ducts.
    g. Material safety data sheets (MSDS) for each product.
    h. Maintenance instructions and recommendations for equipment and systems.
    i. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following, for each product used:
    a. Product Data and Shop Drawings.
    b. Manufacturer's maintenance instructions and recommendations.
    c. Air and water balance reports.
    d. Certificates.
    e. Photocopies of warranties and bonds.

G. Submit 3 sets of revised final volumes prior to final payment.

1.07 ELECTRONIC OPERATION AND MAINTENANCE MEDIA

A. In addition to the hardcopy operating and maintenance data specified above, provide the same information in portable document format (PDF).

B. Generate PDF files directly from software whenever possible. Use scanned documents only when no other option is available.

C. Organize the information as specified for the hardcopy data. Provide a master table of contents with active links to each of the three major parts.

D. Save the information to a standard USB portable drive.

E. Make three (3) identical drives and label them.

F. Deliver drives to the Owner along with the hardcopy data.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

A. Furnish products, spare parts, maintenance materials, and extra materials in quantities specified.

B. Deliver to the site and store where directed. Obtain receipt prior to final payment.

1.09 WARRANTIES AND BONDS

A. Furnish duplicate copies.

B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

C. Assemble in a 3-ring binder with durable plastic cover and table of contents.

D. Submit prior to final Application for Payment.

E. For items delayed beyond Substantial Completion, furnish updated submittals after acceptance, listing date of acceptance as start of warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02-4100 - DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alterations.

1.02 RELATED REQUIREMENTS

A. Mechanical: Special requirements for demolishing mechanical work.

B. Electrical: Special requirements for demolishing electrical work.

1.03 SUBMITTALS

A. Site plan showing:
   1. Interim Life Safety Measures.

B. Description of demolition and removal sequence. Drawings showing location of salvageable items and location of temporary construction.

C. Project record documents. Accurately record actual locations of capped and active utilities and concealed construction.

1.04 QUALITY ASSURANCE

A. Comply with applicable regulations, including the following.
   1. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
   2. ANSI/ASSE A10.6 - Safety and Health Program Requirements for Demolition Operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Demolition and removal of existing partitions and existing finishes as indicated on Demolition Plans.

B. Demolish and remove portions of existing ductwork, HVAC piping and equipment, and associated controls as indicated on Mechanical drawings.

C. Disconnect electrical power in work area, and remove existing electrical wiring back to existing panels.

D. Remove existing lighting and dispose of existing lighting (fluorescents) as required by local and federal regulations.

E. Salvage items indicated on drawings to be salvaged and/or re-used and re-installed.

F. Maintain existing fire alarm system as noted.

G. Fire protection piping shall be demolished and removed or relocated as indicated on Fire Protection Renovation Notes.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is not permitted.
   3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   7. Do not close or obstruct roadways or sidewalks without permit.
   8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

D. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as shown.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01-5000 .

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.

E. Remove existing HVAC, plumbing, fire protection, electrical, and telecommunications systems and equipment as indicated.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. Verify that abandoned services serve only abandoned facilities before removal.
4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove from site, debris, junk, trash, and materials not to be reused on site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06-1000 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preservative treated wood materials.
B. Fire retardant treated wood materials.
C. Concealed wood blocking, nailers, and supports.
D. Miscellaneous wood nailers, furring, and grounds.

1.02 SUBMITTALS

A. Product Data: Provide technical data on wood preservative materials, application instructions, and fire-retardant materials.
B. International Code Council Evaluation Services (ICC-ES) Evaluation Services Report (ESR), and verification of chemicals used and retention levels for species used and conditions of use, for each combination of wood species, chemical treatment, and location used.
C. Certification of compliance with formaldehyde content requirements.
D. List of species and grades where dimensional lumber is to comply with minimum allowable unit-stresses.
E. Chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material. For each type specified include certification by treating plant, indicating type of treatment, solution, pressure process used, net amount of treatment retained, and conformance with applicable standards.

1.03 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
    1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
    2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
B. Lumber fabricated from old growth timber is not permitted.
C. Provide wood products that do not contain:
    1. Added urea-formaldehyde.
    2. Urea-formaldehyde resins.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.
B. Moisture Content: S-dry or MC19.
C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
    1. Lumber: S4S, No. 2 or Standard Grade.
    2. Boards: Standard or No. 3.

2.03 ACCESSORIES

A. Fasteners and Anchors:
    1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.04 ACCESSORIES

A. Fasteners, Plates, Anchors, and other accessories:
    1. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere. Size and type to suit conditions of use.

2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt for anchorage to solid masonry of concrete. Bolt or ballistic fastener for anchorages to steel.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items as indicated .
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with roofing, flashing, or waterproofing.
      d. Treat lumber in contact with masonry or concrete.
      e. Treat lumber in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

D. Lumber or plywood to lumber:
   1. Heads to be flush with wood surface and nail to penetrate adjoining piece minimum 1-1/4 inches.
   2. Minimum 100 pounds per nail installed withdrawal resistance.

E. Lumber or plywood to steel deck:
   1. Verify the presence of conduit below the steel deck prior to installation.
   2. Countersink head flush with surface but not more than 1/3 the thickness of the fastened piece.
   3. Minimum 150 pounds per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1-1/2 inches.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 INSTALLATION OF CONSTRUCTION PANELS

3.05 SCHEDULES

A. Treatment Schedule for Non-Combustible Construction

1. Interior Wood:
    a. Blocking and nailers to support fixtures, railings, cabinets, and interior finishes: Not treated.
    b. Other: Fire-retardant treated.

END OF SECTION

SECTION 06-4100 - ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.
B. Countertops.
C. Solid Surface material.
D. Hardware.
E. Coat Hooks.
F. Factory finishing.

1.02 RELATED REQUIREMENTS

A. Section 06-1000 - Rough Carpentry: Support framing, grounds, anc concealed blocking.

1.03 SUBMITTALS

A. Shop Drawings: Indicate location of each item, with dimensioned plans and elevations, and large scale details, showing materials, components, assembly methods, joint details, list of accessories and manufacturers, attachments, and required for concealed blocking.
    1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
    2. Minimum Scale of Plans and Elevations: 1/4 inch to 1 foot.
    3. Provide the information required by AWI/AWMAC/WI (AWS).
B. Product Data: Provide data for hardware accessories.
C. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
D. Samples for Verification: Two 8 by 8 inch samples of each selected finish for approval.
E. Certification of compliance with Formaldehyde content requirements.

1.04 QUALITY ASSURANCE

A. Comply with Architectural Woodwork Standards (AWS) specifications and recommendations. Where no grade level is indicated comply with Custom Grade standards.
B. Formaldehyde Content: Provide wood products that do not contain added urea-formaldehyde or urea-formaldehyde resins.
C. Fire-Resistant Rating: Class B, per ASTM E84 and NFPA 286 as applicable.
D. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
    1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.
B. Do not deliver woodwork until painting, wetwork, grinding, and similar operations in the installation area have been completed.
C. Store products in an area with temperature and humidity within the normal range for the occupied facility.

1.06 FIELD CONDITIONS

A. Maintain temperature above 50 degrees F, and relative humidity between 25 and 55 percent in storage areas, and in installation areas during installation and remainder of construction period.
B. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
B. Plastic Laminate Faced Cabinets: Custom grade.
C. Cabinetsat Specific Areas:

1. Finish - Exposed Exterior Surfaces: Decorative laminate.
2. Finish - Exposed Interior Surfaces: Decorative laminate.
3. Finish - Concealed Surfaces: Manufacturer's option.
4. Door and Drawer Front Edge Profiles: Square edge with ABS, PVC, or HDPE color-through edge band, 1.4 mm to 2.0 mm thickness.
5. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
6. Layout for Cabinet and Door Fronts: Flush panel.
    a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
7. Adjustable Shelf Loading: 50 lbs. per sq. ft.
    a. Deflection: L/144.
8. Shelves: Industrial Grade Medium Density Particleboard Core.
    a. Thickness:
        1) 3/4 inch up to 3 foot width.
        2) 1 inch for units greater than 3 feet in width, up to 4 foot width maximum.
9. Cabinet Style: Flush overlay.
10. Drawer Side Construction: Manufacturer's choice, as permitted by Grade.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide wood products that meet the requirements of the FSC Controlled Wood Standard.

C. Softwood for opaque finish: AWS Lumber Grade II.

D. Hardwood for opaque finish: AWS Lumber Grade II.

2.03 PANEL PRODUCTS

A. Core: Fire-rated MDF, Class A/Class 1.

B. Large Doors: 1-3/8 inches thick particleboard core doors for door leaves exceeding 30 inches wide or 80 inches tall. PC construction as specified in Section 08-1416.

2.04 LAMINATE MATERIALS

A. Manufacturers:
1. Formica Corporation: www.formica.com
2. Panolam Industries International, Inc; Nevamar: www.nevamar.com
3. Wilsonart, LLC: www.wilsonart.com

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, Color and finish as indicated on Finish Schedule .
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, Color and finish as indicated on Finish Schedule .
3. Cabinet Liner: CLS, 0.020 inch nominal thickness, color as selected or melamine overlay.
4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
5. Location schedule
    a. Vertical Grade: Exterior exposed vertical surfaces of casework, underside of wall cabinets, tops of cabinets 84 inches or less from floor.
    b. Horizontal Grade: Flat countertops, top and bottom of shelves not in cabinets.
    c. Cabinet Liner Grade: Inside of casework visible when open, insides of drawers, backs of doors, top and bottom of shelves inside cabinets.
    d. Backer Grade: Surfaces not exposed after casework is installed, including concealed cabinet backs, bases, wall ends, and backs of drawer fronts.

2.05 COUNTERTOPS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.

B. Plastic Laminate: High pressure decorative laminate sheet bonded to substrate.
   1. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
   2. Exposed Edge Treatment: PVC or HDPE, color-through. Machine-applied and eased; 3 mm thick. Color as selected to match plastic laminate.
   3. Back and End Splashes: Same material, same construction as countertop. Square butt joint, joint between splash and horizontal surface sealed with silicone sealant.

C. Solid Surface Material Countertops and Shelves: Cast, nonporous, filled solid polymer with through body colors meeting ANSI Z124.3 or ANSI Z124.6.
   1. Color, Pattern: As indicated on Finish Schedule
   2. Thickness: 1/2 inch minimum.
   3. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
   4. NSF approved for food contact.
   5. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with ANSI Z124.3.
      a. Style:
         1) Corian Neat 5218. 18 inches x 18 inches x 9 inches deep with offset drain.
         2) Corian Accessible 5610. 27 inches x 16 inches x 5-1/2 inches deep.
      b. Color: Bone, unless noted otherwise.
   6. Back and End Splashes: Same sheet material, coved with square top; minimum 4 inches tall.

2.06 COUNTERTOP FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts for inks, plumbing fixtures, grommets, and other countertop penetrations accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

2.07 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application and formaldehyde content.

B. Joint Sealant: Clear sealant of type recommended by manufacturer for application and use.

C. Metal Bar Stock and Trim:
   1. Stainless Steel: Type 304, brushed finish.
   2. Aluminum: Alloy 6063-T52, clear anodized.

D. Plastic Edge Banding: Extruded PVC , ABS, or HDPE, color-through, flat shaped; width to match component thickness. Machine-applied and eased; 1.4 mm to 2.0 mm thick. Doellken or approved. Color as selected to match plastic laminate.
   1. Color: As selected to match adjacent plastic laminate finish color.
   2. Use at all shelf edges.
   3. Use at edges of doors and drawers. edges of doors and drawers and exposed edges of cabinet bodies.

E. Fasteners: Size and type to suit application.

F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

G. Concealed Joint Fasteners: Threaded steel.

2.08 HARDWARE

A. Hardware: ANSI/BHMA A156.9, types as indicated for quality grade specified. If not indicated, as recommended by fabricator for conditions of use.

B. Shelf Support Brackets: Cold rolled steel, wall mounted, L-Brackets capable of supporting 1200 lbs per pair. Powder-coated finish: Titanium.
   1. Product: KV208 series, manufactured by Knape & Vogt Manufacturing Company.

C. Countertop Bracket: 6063 T-6 extruded aluminum with formed back and TIG welded along both 45 degree mitered sides, and welded across the back. Ground smooth all sharp edges. T-brackets shall be 2 x 2 x 1/4 or 2 x 3 x 3/16 based on counter size per model numbers listed below.
   1. Load Rating: 450 pounds per bracket.
   2. Product: Rakks, EH-1209 for counter depths up to 13 inches, EH-1818 for counter depths up to 25 inches, and EH-1824 for counter depths up to 30 inches: www.rakks.com
   3. Finish: Powder coat, 'Off-white' color unless noted as custom color to match wall paint color in Interiors General Notes and/or Key Notes.

D. Concealed Countertop Bracket:
   1. Load Rating: 300 pounds per bracket.
   2. Products:
      a. A&M Hardware, Inc; Hybrid Concealed Brackets, 12 inch, 18 inch, and 24 inch: www.aandmhardware.com
      b. Rakks; EH-Inside Wall Mount, Flush Mount Brackets; EH1209FM, EH1818FM and EH1824FM: www.rakks.com
   3. Finish: Powder coat, color as selected by Architect.

E. Drawer and Door Pulls: 'U' shaped wire pull, zinc alloy steel with brushed satin nickel finish, 5 inch centers at casework with hardwood veneer. Other locations: Metal wire pulls, 4 inch centers through bolted from back with a 1 5/16 inch projection. Satin chrome or satin stainless steel finish.

F. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish. Provide for doors and drawers where indicated.
   1. Where indicated provide combination type, cam lock with digital button code and swivel lever handle. Provide 2 each 'AAA' batteries for each lock. Orient locks vertically for vertical cabinet doors, and horizontally for horizontal cabinet doors.
      a. Product: KittLock KL1000 manufactured by Kit Lock Coded Locker Solutions. Silver Gray Finish.

G. Catches: Magnetic. 4 pound pull; 7 pound pull for doors over 48 inches tall.

H. Drawer Slides:
   1. Type: Extension types as indicated.
   2. Static Load Capacity-Drawers: 100 pound rating.
   3. Static Load Capacity-File Drawers: 130 pound minimum rating.
   4. Mounting: Side mounted.
   5. Stops: Integral type.
   6. Features-Drawers: Provide self closing/stay closed type.
   7. Features-File Drawers: Provide Soft-close type.
   8. Manufacturers:
      a. Knape & Vogt Manufacturing Company; KV 8417 (Drawers): www.knapeandvogt.com
      b. Knape & Vogt Manufacturing Company; KV 8650FM (File Drawers): www.knapeandvogt.com

I. Hinges: Concealed (fully mortised) self-closing type,165 degree opening, 3-way adjustable, steel with satin finish.

1. Manufacturers:
    a. Blum, Inc; Model 170: www.blum.com
    b. Grass America Inc; Tiomos Series: www.grassusa.com
    c. Hettich America, LP; Euromat Topsafe 4955: www.hettich.com

J. Clip Systems/Wall Cleats: Extruded aluminum, interlocking.
1. Products:
    a. Monarch Metal Fabrication; MF625 clip: www.monarchmetal.com

K. Coat hooks
1. Products:
    a. Bobrick; B-7671: www.bobrick.com

2.09 DRAWERS AND KEYBOARD TRAYS

A. Drawer Slides: Cold rolled steel, zinc plated, positive stop, rolling steel balls, steel rollers.
1. Pencil drawers: 3/4 extension, 75 pound rating. Knape & Vogt 1284.
2. File drawers: Full extension, 150 pound rating. Knape & Vogt 8500.
3. Other drawers: Full extension, 100 pound rating. Knape & Vogt 8400 series.

2.10 TELECOMMUNICATIONS ACCESSORIES

A. Grommets:
1. G-1: Plastic, 2-13/16 inches inside diameter, with slotted cap. Mockett XG, color as selected by Architect.

2.11 SHOP TREATMENT OF WOOD MATERIALS

A. Provide UL (DIR) listed and approved identification on fire retardant treated material.

B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.12 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
2. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
1. Provide balance matched panels at each elevation.
2. Carry figure of cabinet fronts to toe kicks.

F. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.13 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
1. Transparent:

a. Stain: As selected by Architect.
b. Sheen: Flat.

E. Hardware: Chrome-plated steel or brass, satin finish where available; satin natural finish aluminum.
F. Fastener Covers: Plastic plugs, self-adhesive vinyl; color to match adjacent surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
B. Condition woodwork to humidity and temperature conditions within the normal range expected for the building prior to beginning installation.
C. Scribe and cut work to fit adjoining work; refinish cut surfaces and repair finish at cuts.
D. Install standing and running trim with minimum number of joints, using full-length pieces from maximum length of lumber available, to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners.
E. Install without distortion so doors and drawers fit openings. Center doors and drawers in openings. Maintain veneer sequence matching of casework with transparent finish.
F. Anchor countertops securely to base units and other support systems.
G. Countertop support spaces: 3'-6" maximum.
H. Complete painting, wetwork, grinding and similar operations in areas to receive woodwork prior to beginning installation.
I. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
J. Use fixture attachments in concealed locations for wall mounted components.
K. Use concealed joint fasteners to align and secure adjoining cabinet units.
L. Use fine finishing nails for exposed nailing, countersink and fill flush with woodwork; match final finish.
M. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
N. Secure cabinets to floor using appropriate angles and anchorages.
O. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

A. Repair damaged and defective woodwork wherever possible to eliminate defects. Where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
B. Adjust installed work.
C. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.
B. Clean hardware; lubricate and make final adjustments for proper operation.
C. Clean exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged and soiled areas.

END OF SECTION

SECTION 07-8400 - FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestop sealers.

1.02 SYSTEM DESCRIPTION

A. Testing laboratory: Firestop assemblies shall be listed by UL, Warnock Hersey, or other independent testing laboratory acceptable to governing authorities. Testing shall comply with ASTM E814 or UL 1479.

B. Test rating shall be equal to or greater than the assembly being penetrated. Above-ceiling rating shall be 2-hour minimum.

C. Installed assemblies shall be stable, and shall be unaffected by freezing, humidity, or water.

D. Installed assemblies shall be easily re-entered and repaired without special tools.

1.03 SUBMITTALS

A. Evidence of manufacturer's training and approval of installer.

B. Schedule of firestop conditions, testing laboratory listing number, and other code acceptance information for each condition and assembly.

C. Manufacturer's Product Data for each material used.

D. Shop Drawings for each combination of wall construction and penetration. For each condition, indicate:

1. Material, shape, and movement of penetrating object.
2. Materials in assembly being penetrated.
3. Type and quantity of firestop materials and accessories.
4. Testing laboratory design number.
5. F, T, and L rating.

E. Where conditions require modification of a listed assembly, submit drawings showing listed base assembly and changes, approved by the firestop system manufacturer's engineering judgment.

F. Sample of each type of label.

1.04 QUALITY ASSURANCE

A. Provide firestopping products from a single manufacturer to the greatest extent possible.

B. Installer:

1. Trained and approved by the manufacturer.

C. Provide a mock-up of each assembly. Each mock-up shall be accepted by the code official before continuing installation of that type of assembly. Accepted mock-ups will be the standard for remaining assemblies of the same type.

D. Assemblies for top-of-wall joints and other moving joints shall be listed for dynamic joints with movement capabilities to match joint movement.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. 3M Fire Protection Products: www.3m.com/firestop

B. Hilti, Inc: www.us.hilti.com

C. Nelson Firestop Products: www.nelsonfirestop.com

D. Specified Technologies (STI): www.stifirestop.com

2.02 FIRESTOP

A. Materials: Caulk, spray, pipe wrap, composite sheet, restricting collar, galvanized steel sleeve, moldable putty, foam, mineral wool, and backing as required for each condition by listed design or approved engineering judgment.

B. VOC content: As required bySCAQMD 1168 .

2.03 FIRE SAFING INSULATION AND ACCESSORIES

A. Safing insulation: Semi-rigid boards designed for use as fire safing, ASTM C612, Classes 1 and 2; nominal density 4.0 pcf; passing ASTM E136 for combustion characteristics; R value 4.0 at 75 degrees F.

B. Caulk: Recommended by safing insulation manufacturer for sealing joint between safing insulation and edge of floor slab.
C. Safing clips: Galvanized steel, approved by safing insulation manufacturer.
D. Accessories: As required for complete installation.

2.04 LABELS

A. Label: Self-adhesive, non-fading, preprinted, vinyl or metal foil. After application, attempts to remove the label shall partially destroy the label. Label content:
   1. "Warning: Through-Penetration Firestop System – Do Not Disturb".
   2. Installer's name, address, phone number.
   3. Designation of applicable testing and inspection agency.
   4. Date of installation.
   5. Name of manufacturer, manufacturer's model identification.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install materials according to manufacturer's installation instructions for specific conditions of use and UL listing.
B. Unless it is specified that a joint receive both firestopping and another sealant, do not install other joint sealants where firestopping is required.
C. Where penetration is through construction that contains voids, including metal framed assemblies and hollow concrete masonry units, install firestop on both sides of assembly.
D. Do not conceal firestopping until it has been inspected by the ITA, and has been approved by the code official.
E. Install fire safing where indicated, and at openings between edge of slab and exterior wall panels.
F. Remove excess material from exposed surfaces.
G. Provide labels at each side of each firestop assembly. Install within 10 days after completion of assembly.
   1. Penetrations: Within 6 inches of an edge of the assembly.
   2. Other locations: Within 6 inches of the assembly, maximum 50 feet on center.
   3. Exception: Labels may be omitted if visible in a finished area if approved in writing by the code official.
H. Submit documentation of each firestop location. For each location, indicate name of installer firm, firestop manufacturer, manufacturer's model identification, hourly rating, and design number from applicable independent testing agency.

3.02 FIELD QUALITY CONTROL

A. The Owner's independent testing laboratory (ITA) will perform field quality control testing.
B. The ITA will report results to the Architect.
C. Repair or replace work within areas where testing or inspection indicates firestopping is noncompliant. Repair work damaged by testing.

END OF SECTION

SECTION 07-9200 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Liquid-applied joint sealants.

B. Preformed joint seals.

1.02 SUBMITTALS

A. Manufacturer's product data for each product and accessory to be used. Include the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
      a. Substrates product is known to satisfactorily adhere to and with which it is compatible.
      b. Substrates the product should not be used on.
      c. Substrates for which primer is required.
      d. Substrates for which laboratory adhesion and/or compatibility testing is required.
   3. Installation instructions, including precautions, limitations, recommended backing materials, and recommended tools.
   4. SWRI Validation: Provide currently available sealant product validations as published by SWRI for specified sealants.

B. Manufacturers' installation instructions, and recommendation for tools to be used.

C. Color cards of standard colors for selection, where sealant color is not specified.

D. Verification color samples for each color and type of material. Minimum two, to show range of appearance of cured product.

E. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

1.03 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Installer: Company specializing in performing the work of this section and with at least five years of documented experience.

C. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
   1. Identification of testing agency.
   2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
      a. Test date.
      b. Copy of test method documents.
      c. Age of sealant upon date of testing.
      d. Test results, modeled after the sample form in the test method document.
      e. Indicate use of photographic record of test.
   3. Submit filled out Preinstallation Field Adhesion Test Reports and logs within 10 days after completion of tests; include bagged test samples and photographic records.

D. Field Adhesion Test Procedures:
   1. Allow sealants to fully cure as recommended by manufacturer before testing.
   2. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
   3. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.

4. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
5. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

E. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inch long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.04 WARRANTY

A. Correct defective work within a five year period after Substantial Completion. Remove, repair, and replace at no additional cost to the Owner.

B. Warranty: Include coverage for installed sealants, seals, and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Silicone sealants:
1. Bostik, Inc: www.bostik-us.com
2. Dow Inc: www.dow.com
3. Momentive Performance Materials, Inc (GE): www.momentive.com
4. Pecora Corporation: www.pecora.com
5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com
6. Sika Corporation: usa.sika.com

B. Polyurethane sealants:
1. Bostik, Inc: www.bostik-us.com
2. Dow Inc: www.dow.com
3. Momentive Performance Materials, Inc (GE): www.momentive.com
4. Pecora Corporation: www.pecora.com
5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com
6. Sika Corporation: usa.sika.com

C. Preformed seals.
1. Balco: www.balcousa.com
2. Emseal: www.emseal.com
3. MM Systems: www.mmsystemscorp.com

2.02 LIQUID-APPLIED JOINT SEALANTS GENERAL REQUIREMENTS

A. Performance: Non-staining, non-shrinking, non- drying, non-migrating, permanently elastic; recommended by sealant manufacturer for conditions of service, based on field experience and laboratory testing. Where given choice of 1 part or 2 part product, use the one with optimum performance for conditions of use.

B. Compatibility: Recommended or approved by manufacturer for substrates and for conditions of use.

C. Service temperature range, exterior products: Minus 40 to plus 180 degrees F.

D. Color: As selected from manufacturer's standard colors.

2.03 VOC CONTENT, INTERIOR PRODUCTS

A. Sealant: South Coast Air Quality Management District (SCAQMD) Rule No. 1168, and Bay Area Air Quality Management District (BAAQMD) Regulation 9, Rule 51.

B. Primers: South Coast Air Quality Management District (SCAQMD) Rule No. 1168.

2.04 PREFORMED JOINT SEALS

A. Prefinished joint seal: Open-cell, high density, polyurethane foam, impregnated with water-based, stabilized, acrylics crosslinked ethylene vinyl acetate (EVA), with integral silicone face. Color as selected.

B. Depth: As recommended by manufacturer for conditions of use.

C. Exposed exterior walls: Color as selected. Emseal Colorseal, or approved.

D. Concealed exterior walls: Emseal 25V or approved.

E. Concealed by expansion joint assembly cover: Emseal DSH or approved.

2.05 LIQUID-APPLIED JOINT SEALANTS

A. SNT-01. Mildew-resistant silicone: ASTM C920, Grade NS, Uses M and A.

B. SNT-02. Non-staining silicone for masonry: ASTM C920, Grade NS, Uses M and A.

1. Movement Capability: Plus 100 percent, minus 50 percent.
2. Non-Staining To Porous Stone: Non-staining to light-colored stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

C. SNT-03. Silicone: ASTM C920, Grade NS, Uses M and A.

1. Movement Capability: Plus 100 percent, minus 50 percent.

D. SNT-11. Polyurethane: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 25 percent.

E. SNT-12. Traffic-grade polyurethane: ASTM C920, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.

1. Movement Capability: Plus and minus 25 percent.
2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.

F. SNT-21. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

1. Grade: ASTM C834; Grade - Minus 18 Degrees C.

G. SNT-22. Semi-Rigid Self-Leveling Polyurea: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Hardness: 75, Shore A, minimum, when tested in accordance with ASTM D2240 after 7 days.

2.06 ACCESSORIES

A. Backer rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.02 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Select joint backer to achieve width-to-depth ratio, neck dimension, and surface bond area recommended by manufacturer.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.03 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.04 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

3.05 SCHEDULES

A. Interior sealants.
   1. SNT-01. Plumbing fixtures, countertops, wet areas.
   2. SNT-11. Default sealant where other sealant is not indicated.
   3. SNT-12. Horizontal plane joints in slabs.
   4. SNT-21. Frames, static, non-stressed joints.
   5. SNT-22. Slab saw cuts.

3.06 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Interior joints: Do not seal interior joints unless specifically indicated to be sealed. Seal the following.
      a. Joints between door, window, and other frames and adjacent construction.
      b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
   2. Do not seal the following.
      a. Joints to receive firestopping.
      b. Joints indicated to receive manufactured expansion joint cover or other sealing device.
      c. Joints where sealant is specified to be provided by manufacturer or installer of product to be sealed.
      d. Joints where installation of sealant is specified in another section. Examples: Precast concrete panels, metal panels.
      e. Joints between suspended panel ceilings and walls.

END OF SECTION

SECTION 08-1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hollow metal frames for wood doors.

1.02 RELATED REQUIREMENTS

A. Section 08-1416 - Flush Wood Doors: Wood doors installed in hollow metal frames.
B. Section 08-7100 - Door Hardware.
C. Section 08-8000 - Glazing: Glass for doors and borrowed lites.
D. Section 09-9000 - Painting: Field painting.

1.03 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements. Include:
    1. Details of door design and construction, hardware locations, anchorage and fastening, frame types and details, anchor types and spacing, and finish requirements.
    2. Glass thickness and setting methods to confirm that glazing frames, doors, and stops have been coordinated with glass and glazing requirements.
    3. Certification of primer lead content.
C. Samples: Submit two samples of metal, 2 inch by 2 inch in size showing factory finishes, colors, and surface texture.
D. Samples of construction consisting of a 12 inches by 18 inches corner of door and frame including hinge mortise, if requested.
E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.04 QUALITY ASSURANCE

A. Provide doors and frames from a single manufacturer.
B. Where a fire resistive rating is required, provide products that are UL or Warnock-Hersey tested, listed, and labeled for the class of opening indicated, complying with NFPA 80 and NFPA 252 based on testing according to current IBC requirements.
C. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: www.steeldoor.org/sdicertified.php/#sle.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
    1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com
    2. Curries, an Assa Abloy Group company: www.assaabloydss.com
    3. Republic Doors, an Allegion brand: www.republicdoor.com
    4. Steelcraft, an Allegion brand: www.allegion.com
    5. West Central Manufacturing: www.westcentralmfg.com

2.02 PERFORMANCE REQUIREMENTS

A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Corner Construction: Mitered faces; tightly closed miter or butted rabbet, soffit, and stop joints. Completely back welded, exposed welds ground smooth. No evidence of welds or mitered face joints in completed assembly.

1. Fabrication: Accurately formed to indicated profile with hairline joints.

C. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

D. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

E. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.04 MATERIALS

A. Steel Sheet and Strip: ASTM A568 carbon steel; ASTM A1008 cold rolled or ASTM A1011 hot rolled; pickled and annealed, with stretcher level of flatness.

B. Galvanizing: ASTM A653A, G60 or A60 zinc coating, mill phosphatized.

2.05 HARDWARE PREPARATION

A. Coordination: Obtain hardware listing and templates from hardware supplier.

B. Preparation: Provide cutouts for mortised hardware, securely weld reinforcing in place, drill and tap to proper template. Comply with applicable requirements of ANSI A115 series specifications. Attach to develop full strength of reinforcement.

1. Hinge Reinforcement: 3/16 inch by 1-1/2 inches by 9 inches.
2. Strike Clips: 3/16 inch by 1-1/2 inches by 3 inches.
3. Closer and Holder Reinforcing: 12 gauge, 14 inches long.

C. Surface Hardware Reinforcing: 12 gauge for surface-mounted hardware.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install smoke control doors per NFPA 105.

C. Coordinate frame anchor placement with wall construction.

D. Plumb, align, and brace securely in position until permanently anchored in place. Install frames with at least 3 wall anchors per jamb at hinge and strike locations.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Spray foam frames in exterior walls.

G. Immediately after installation, sand damaged areas of prime coat and touch up with a compatible air-drying primer.

H. Install door hardware as specified in Section 08-7100.

I. Comply with glazing installation requirements of Section 08-8000.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08-1416 - FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors, with wood veneer.

B. Factory finishing.

1.02 RELATED REQUIREMENTS

A. Section 08-1113 - Hollow Metal Doors and Frames.

B. Section 08-7100 - Door Hardware.

C. Section 08-8000 - Glazing.

1.03 SUBMITTALS

A. Manufacturer's Product Data: For each type of door, indicate door core materials and construction; veneer species, type and characteristics. Data to include details of core construction, trim for openings, finish options for each component, and factory finishing specifications.

B. Shop Drawings: Show locations of doors and frames, elevations, sizes, types, thickness, grade, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, label requirements, the prematching of hardware locations of each opening, cutouts for glazing and other details.

C. Verification Samples: Submit minimum two samples of door veneer, 12 inch by 12 inch in size illustrating wood grain, stain color, and sheen. Furnish sufficient number of samples to illustrate the range of finish to be expected in the Work.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

E. Certification of compliance with formaldehyde content requirements.

F. Warranty, executed in Owner's name.

1.04 QUALITY ASSURANCE

A. Verify hardware groups for each opening. Provide doors rated for application of scheduled hardware.

B. Comply with ANSI/WDMA I.S. 1A.

C. Formaldehyde content: Provide wood products that do not contain:

1. Added urea-formaldehyde.
2. Urea-formaldehyde resins.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.06 WARRANTY

A. Interior Doors: Provide manufacturer's warranty for the life of the installation. Replace doors exhibiting defects in materials or workmanship within guarantee period with new doors, including hanging and finishing, at no cost to the Owner.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers:

1. Forte Openings: www.forteopenings.com
2. VT Industries, Inc: www.vtindustries.com

2.02 DOORS

A. Doors:

1. Quality Standard: Premium Grade, Extra Heavy Duty performance, in accordance with WDMA I.S. 1A.

2. Wood Veneer Faced Doors: 5-ply or 7-ply.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
1. Provide solid core doors at each location.
2. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide flush wood door assemblies in compliance with WDMA I.S. 1A requirements for "S" label; no additional gasketing or edge sealing allowed.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

A. Wood veneer facing for transparent finish: Match species and cut of existing doors. Match stain finish; provide sample for review.
1. Minimum Thickness: 1/50 inch after finish sanding, at 12 percent moisture content.
2. Vertical Edges: Same species as face veneer.
3. Leaves book matched; face assembly balance matched.

B. Facing Adhesive Classified per WDMA TM-6 "Adhesive Bond Test Method": Type I for exterior locations, Type II - water resistant for interior locations.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
2. Provide solid blocking for other throughbolted hardware.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
1. Transparent:
a. System - TR-6, Catalyzed Polyurethane.
b. Stain: As selected by Architect.
c. Sheen: Satin.

B. Factory finish doors in accordance with approved sample.

2.07 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08-1113.

B. Glazing: As indicated on the Opening Schedule and as specified in Section 08-8000.

C. Glazing frames.
1. Non-rated: Flush wood frames, hardwood to match face veneer.
2. 20-minute: Rated stops with wood appearance to match face veneer.
3. Greater than 20-minute: Metal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Condition doors to average temperature and humidity in area of installation minimum 48 hours before installation.

B. Install doors in accordance with manufacturer's instructions and specified quality standard.
1. Comply with ANSI/WDMA I.S. 1A, "Care and Installation at Job Site."

C. Use machine tools to cut or drill for hardware. Restore finish before installation if fitting or machining is required at site.

D. Coordinate installation of doors with installation of frames and hardware.

E. Visible surfaces shall be free of tool marks, open joints, and slivers.

3.02 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08-7100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 CONDITIONS

A. Conditions of the contract (General and Supplementary Conditions) and Division 01 - General Requirements, govern the work of this section.

B. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings or specified herein.

C. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.

D. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

1.2 WORK INCLUDED

A. This section includes the following:

1. Furnish door hardware (for hollow metal, wood and aluminum doors) specified herein, listed in the hardware schedule, and/or required by the drawings.
2. Cylinders for Aluminum Doors
3. Thresholds and Weather-stripping (Aluminum frame seals to be provided by aluminum door supplier)
4. Electro-Mechanical Devices
5. Access Control components and or systems specified within this section.

B. Where items of hardware are not definitely or correctly specified and is required for the intended service, such omission, error or other discrepancy should be directed to the Architect prior to the bid date for clarification by addendum. Otherwise furnish such items in the type and quantity established by this specification for the appropriate service intended.

1.3 RELATED WORK IN OTHER SECTIONS

A. This section includes coordination with related work in the following sections:

1. Division 06 Section "Finish Carpentry".
2. Division 06 Section "Cabinet Hardware"
3. Division 08 Section "Hollow Metal Doors and Frames".
4. Division 08 Section "Wood Doors"
5. Division 08 Section “Storm Doors”
6. Division 08 Section "Aluminum Entrances and Storefronts"
7. Division 26 Sections “Electrical”
8. Division 28 Sections "Electronic Safety and Security".

1.4 REFERENCES

A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.

1. DHI – Installation Guide for Doors and Hardware (2020).
2. NFPA 80 - Standards for Fire Doors and Windows.
3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
4. UL - Building Material Directory.

5. DHI - Door and Hardware Institute
6. WHI - Warnock Hersey
7. BHMA - Builders Hardware Manufacturers Association
8. ANSI – American National Standards Institute
9. IBC - International Building Code 2018 Edition (as adopted and amended by local building code)

1.5 SUBMITTALS

A. Within ten days after award of contract, submit detailed hardware schedule in quantities as required by Division 01 - General Requirements.

B. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door & Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets shall be consolidated to group multiple door openings which share similar hardware requirements. Schedule shall include the following information:

1. Door number, location, size, handing, and rating.
2. Door and frame material, handing.
3. Degree of swing.
4. Manufacturer
5. Product name and catalog number
6. Function, type and style
7. Size and finish of each item
8. Mounting heights
9. Explanation of abbreviations, symbols, etc.
10. Numerical door index, indicating the hardware set/ group number for each door.

C. When universal type door closers are to be provided, the schedule shall indicate the application method to be used for installation at each door: (regular arm, parallel arm, or top jamb).

D. The schedule will be prepared under the direct supervision of a certified Architectural Hardware Consultant (AHC), or certified Door Hardware Consultant (DHC) employed by the hardware distributor. The hardware schedule shall be signed and embossed or stamped with the DHI certification seal of the supervising AHC or DHC. The supervising AHC or DHC shall attend any meetings related to the project when requested by the architect.

E. Check the specified hardware for suitability and adaptability to the details and surrounding conditions.

F. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate unsuitable or in compatible items, and proposed substitutions in the hardware schedule.

G. Provide documentation for all hardware to be furnished on labeled fire doors indicating compliance with positive pressure fire testing UL 10C.

H. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 01 - General Requirements.

I. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish, style, and function as specified herein. Tag each sample with its permanent location so that it may be used in the final work.

J. Furnish with first submittal, a list of required lead times for all hardware items.

K. After final approved schedule is returned, transmit corrected copies for distribution and field use in quantities as required by Division 01 - General Requirements.

L. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related trades.

M. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical devices or systems as required by related trades. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

N. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the owner's representative to determine keying requirements. Upon completion of initial key meeting, hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the door and hardware institute's publication "Keying Procedures, Systems, and Nomenclature". Submit copies of owner approved key schedule for review and field use in quantities as required by Division 01 - General Requirements. Wiring diagrams shall be included in final submittals transmitted for distribution of field use.

1.6 QUALITY ASSURANCE

A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items by approved manufacturers that are equal in design, function, and quality, may be considered for prior approval of the architect, provided the required data and physical samples are submitted for approval as set forth in Division 01 - General Requirements.

B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products shall meet or exceed certification requirements for the respective grade indicated within this specification. Supplier shall provide evidence of certification when requested by the architect.

C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Electrical drawings and electrical specifications are based on the specific electrified hardware components specified in hardware sets. When electronic hardware components other than those indicated in hardware sets are provided, the supplier shall be responsible for all costs incurred by the design team and their consultants to review and revise electrical drawings and electrical specifications. Supplier shall also be responsible for any additional costs associated with required changes in related equipment, materials, installation, or final hook up to ensure the system will operate and function as indicated in the construction documents, including hardware set operational / functional descriptions.

E. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.

F. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.

G. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.

H. Provide hardware for all labeled fire doors, which complies with positive pressure fire testing UL 10C.

I. Comply with all applicable provisions of the standards referenced within section 1.4 of this specification.

J. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved items.

1.7 DELIVERY, STORAGE AND HANDLING

A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.

B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and door number.

C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection against loss and damage at job site.

D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and hardware supplier immediately after receipt of material at the job site.

E. Coordinate with related trades under the direction of the contractor for delivery of hardware items necessary for factory installation.

1.8 PRE-INSTALLATION MEETING

A. Schedule a hardware pre-installation meeting on site to review and discuss required door operating clearances and the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.

B. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.

C. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

1.9 WARRANTY

A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division 01 - General Requirements.

B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

PART 2 - PRODUCTS

2.1 FASTENERS

A. All exposed fasteners shall be Phillips head or as otherwise specified and shall match the finish of the adjacent hardware. All fasteners ex-posed to the weather shall be non-ferrous or stainless steel. Furnish correct fasteners to accommodate surrounding conditions.

B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing through-bolts. Furnish through-bolts as required for materials not readily reinforced.

2.2 BUTT HINGES

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Stanley	Hager	McKinney
1. Standard Weight, Plain Bearing	5PB1	F179	****	T2714
2. Standard Weight, Ball Bearing	5BB1	BB179	BB1279	TB2714
3. Standard Weight, Ball Bearing, Non-Ferrous	5BB1	FBB191	BB1191	TB2314
4. Heavy Weight, Ball Bearing	5BB1HW	FBB168	BB1168	T4B3786
5. Heavy Weight, Ball Bearing, Non-Ferrous	5BB1HW	FBB199	BB1199	T4B3386

B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.1 (2006). Hinges shall meet or exceed the following ANSI grade requirements as indicated below:

1. Standard Weight, Plain Bearing Hinges: Grade 3
2. Standard Weight, 2 Ball Bearing Hinges: Grade 2
3. Heavy Weight, 4 Ball Bearing Hinges: Grade 1

C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.

1. 3 hinges for doors up to 90 inches.
2. 1 additional hinge for every 30 inches on doors over 90 inches.
3. 4 hinges for Dutch door applications.

D. Unless otherwise specified, top and bottom hinges shall be located as specified in Division 08 Section "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

E. Unless otherwise specified, furnish hinge weight and type as follows:

1. Standard weight: plain bearing hinge 5PB1 or ball bearing hinge 5BB1 for interior openings through 36 inches wide without a door closer.
2. Standard weight: ball bearing hinge 5BB1 for interior opening over 36 through 40 inches wide without a door closer, and for interior openings through 40 inches wide with a door closer.
3. Heavyweight: 4 ball bearing hinge 5BB1HW for interior openings over 40 inches wide, and for all vestibule doors.
4. Heavyweight: 4 ball bearing hinge 5BB1HWss for exterior openings unless otherwise listed in groups.
5. Heavyweight: 4 ball bearing hinge 5BB1HWss 5” for all exterior doors or 4 ball bearing hinge 5BB1HW 5” for interior doors, that have an automatic operator.

F. At existing frames receiving new hinges, match existing hinge size and weight.

G. Unless otherwise specified, furnish brass, bronze, or stainless-steel base metal for hinges at exterior doors. Unless otherwise specified, furnish steel base metal for hinges at interior doors.

H. Furnish stainless steel base metal for hinges at showers, pools, and wash bay doors.

I. Unless otherwise specified, furnish hinges in the following sizes:

1. 5" x 5" 2-1/4" thick doors
2. 4-1/2" x 4-1/2" 1-3/4" thick doors
3. 3-1/2" x 3-1/2" 1-3/8" thick doors

J. Furnish hinges with width to accommodate trim and allow for 180-degree swing.

K. Unless otherwise specified, furnish hinges with flat button tips with non-rising pins at interior doors, non-removable loose pins (NRP) at exterior, and out-swinging lockable interior doors.

L. Unless otherwise specified, furnish all hinges to template standards.

2.3 CONTINUOUS PIN AND BARREL HINGES

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Markar	Stanley
1. Edge Mount Pin & Barrel Stainless Steel Continuous Hinge	700 Series	300 Series	650 Series

B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.26, Grade 1 (2012).

C. Continuous hinges shall be full height pin and barrel type hinge providing full height door support up to 600 lbs. Edge mount (unless noted otherwise).

D. Construct hinges of heavy-duty 14-gauge material. The stainless internal pin shall have a diameter of 0.25 and the exterior barrel diameter of 0.438.

E. Hinge shall be non-handed with symmetrical template hole pattern and factory drilled. Hinge must accept a minimum of 21 fasteners on the door and 21 fasteners on the frame.

F. Each knuckle to be 2 inches, including split nylon bearing at each separation for quiet, smooth, self-lubricating operation.

G. Hinge to be able to carry Warnock Hersey Int. or UL for fire rated doors and frames up to 3 hours.

H. Provide machine screws for doors which have been reinforced to accept machine screws.

I. Note: Fire label for doors and frames should be placed on the header and top rail of fire rated doors and frames.

J. Provide adjusting screws equal to Ives "Adjust-a-Stud" for continuous hinges specified as 705. Adjustment to be able to correct frame fit problems up to 3/8 inch.

2.4 PIVOTS

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Rixson
1. ¾" Offset Pivot Set (Lead Lined)	7237	L117

B. Obtain pivots from a single manufacturer, although several may be indicated as offering products complying with requirements.

C. Unless otherwise specified, furnish the following pivot quantities for each door leaf.

1. Bottom Pivot: one each pivot per leaf.
2. Top Pivot: one each pivot per leaf.
3. Intermediate Pivots: Doors over 60" require the use of one intermediate pivot. Every additional 30" of door height warrants another intermediate pivot.
4. Pocket Pivots: Doors over 80" require the use of four pocket pivots. Every additional 30" of door height warrants another pocket pivot.

D. Unless otherwise specified, intermediate pivots and pocket pivots shall be located equidistant from others.

E. Unless otherwise specified, furnish pivots for exterior doors, fabricated from brass, bronze, or stainless steel. Pivots for fire doors shall be ferrous and match the finish of adjacent hardware.

F. Bottom pivots provided for exterior doors shall incorporate fully sealed bearings, cap seals, and corrosion resistant plating on bottom pin.

G. Provide extended length spindles as required to accommodate sill details.

H. Furnish pivots with offset to accommodate trim and allow for 180-degree swing. Provide 1-1/2″ offset when required by adjacent construction. Coordinate with related trades as required to ensure adjacent construction will not interfere with full range of door movement.

2.5 POWER TRANSFERS

A. Acceptable manufacturers and respective catalog numbers:

	Von Duprin	ASSA
1. Concealed Two Wire	EPT-2	CEPT-10
2. Concealed Ten Wire	EPT-10	CEPT-10

B. Door cords shall be armored cable with screw on caps.

C. Concealed power transfers shall be concealed in the door and frame when the door is closed.

D. Concealed power transfers shall have a steel tube to protect wires from being cut.

E. Concealed power transfers with spring tubes shall be rejected.

F. Concealed power transfers shall be supplied with a mud box to house all terminations.

2.6 FLUSH BOLTS AND DUST PROOF STRIKES

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Trimco	Hager
1. Dust Proof Strike	DP2	3910	280X
2. Constant Latching Bolt (Metal Door)	FB51P	3820	293D
3. Constant Latching Bolt (Wood Door)	FB61P	3825L	294D

B. Unless otherwise specified, provide 12" rods for manual flush bolts for door 7'6" or less, 24" top rods for doors over 7'6" to 8'6".

C. Unless otherwise specified, provide doors over 8'6" with automatic top bolts.

D. Provide automatic flush bolts where required to maintain fire door listing and or egress requirements on pairs of doors.

E. All flush-bolt applications shall be UL listed to be installed with top flush-bolt only. Provide auxiliary fire bolt as required for fire rated openings where less bottom bolt has been specified.

F. Provide all bottom flush bolts with non-locking dust proof strikes.

2.7 EXIT DEVICES

A. Acceptable manufacturers and respective catalog numbers:

	Von Duprin
1. Wide Stile, Push Pad	99 Series
2. Lever Trim	996 Series
3. Pull Trim	990 Series

B. Exit devices shall be independently certified by ANSI for compliance with ANSI A156.3, Grade 1 (2008).

C. Obtain exit devices from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. All exit devices shall be equipped with a sound-dampening feature to reduce touch pad return noise.

E. Quiet Electric Latch Retraction shall be accomplished using a motor driven assembly, and shall incorporate the following features:

1. Motor shall retract both the push pad assembly and latchbolt.
2. Automatic calibration of latch throw and pull.
3. Built-in time delay.
4. On-board installation and troubleshooting diagnostics built into power supply and device.
5. Retry mode if device does not pull on the first try.

F. On full glass doors there shall be no exposed fasteners on the back of the mechanism visible through the glass.

G. All exit devices shall be provided with flush end caps to reduce potential damage from impact.

H. All exit devices shall be provided with dead-locking latch bolts to ensure security.

I. All exit devices shall be U.L. listed for accident hazard. Exit device for use on fire doors shall also be U.L. listed for fire exit hardware.

J. Provide optional strikes, special length rods, and adapter plates to accommodate door and frame conditions. Provide narrow style series devices in lieu of wide stile series devices where optional strikes will not accommodate door and frame conditions.

K. Coordinate with related trades to ensure adequate clearance and reinforcement is provided in doors and frames. Provide thru bolts as required.

L. Refer to hardware groups for exit device applications utilizing the option of: "less bottom rod and floor strike" (LBR)

M. All exit devices shall be provided with optional trim designs to match other lever and pull designs used on the project.

N. Unless specific exit device dogging options are noted within hardware sets, provide dogging options as follows:

1. Fire Rated devices: Dogging not permitted.
2. Non-Rated Exit Only functions not equipped with outside trim or pull: Less Dogging.
3. Non-Rated Classroom functions: Less Dogging.
4. Non-Rated devices utilizing electric latch retraction or electrified outside trim: Less Dogging.
5. All Other Non-Rated devices: Cylinder Dogging utilizing interchangeable core cylinders. Cylinder keyway shall match locksets furnished on this project.

O. Provide glass bead kits as required to accommodate door conditions. Screws shall not be visible through full glass doors.

P. Where specified, provide compatible keyed mullions with cylinder for pairs of doors.

Q. Provide Von Duprin #154 or equivalent mullion/frame stabilizers at the following application(s):

1. Lockable exterior or vestibule paired openings with a fixed or removable hollow metal or aluminum mullion.
2. Lockable exterior or vestibule single doors in aluminum frames.

R. Provide reinforced crossbars for all traditional style exit devices applied to doors over 36" wide.

2.8 LOCKS AND LATCHES

A. Acceptable manufacturers and respective catalog numbers:

	Schlage
1. Grade 1 Mortise	L Series 17A
2. Grade 1 Cylindrical	ND Series SPA

B. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011). Interconnected locks shall be independently certified by ANSI for compliance with ANSI A156.12 (2013). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13 (2012).

C. Unless otherwise specified, all locks and latches to have:

1. 2-3/4" Backset
2. 1/2" minimum throw latchbolt
3. 1" throw deadbolt
4. ANSI A115.2 strikes

D. Provide guarded latch bolts for all locksets, and latch bolts with throw to maintain fire rating of both single and paired door assemblies.

E. Provide strike with lip length adequate to clear surrounding trim.

F. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar covers.

G. Provide Von Duprin #154 or equivalent mullion/frame stabilizers at the following application(s) unless provided with deadbolt:

1. Lockable exterior or vestibule paired openings with a fixed or removable hollow metal or aluminum mullion.
2. Lockable exterior or vestibule single doors in aluminum frames.

2.9 PULLS, PUSH BARS, PUSH/PULL PLATES

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Burns	Hager
1. Offset Door Pull (1" dia., 10" CTC)	8190-0	39C	12J
2. Offset Pull / Push-Bar (1" dia., 10" CTC Pull)	9190-0	422 x 39C	159

B. Adjust dimensions of push plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, push plates shall be factory drilled for cylinders or other mortised hardware. All push plates shall be beveled 4 sides and counter sunk.

C. Where required on wide stile doors, install straight pull offset of cylinder to allow for access to cylinder.

D. Where possible, provide back-to-back, and concealed mounting for pulls and push bars. Push bar length shall be 3" less door width, or center of stile to center of stile for stile & rail or full glass doors.

2.10 CLOSERS

A. Acceptable manufacturers and respective catalog numbers:

	LCN
1.	4050A / 4050A EDA

B. Door closers shall be independently certified by ANSI for compliance with ANSI A156.4, Grade 1 (2013).

C. Obtain door closers from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Provide extra heavy-duty arm (EDA / HD) when closer is to be installed using parallel arm mounting.

E. Hardware supplier shall coordinate with related trades to ensure aluminum frame profiles will accommodate specified door closers.

F. Closers shall use aluminum cylinders.

G. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UL10C.

H. Unless otherwise specified, all door closers shall have full covers and separate adjusting valves for sweeps, latch, and backcheck.

I. Provide closers for all labeled doors. Provide closer series and type consistent with other closers for similar doors specified elsewhere on the project.

J. Provide closers with adjustable spring power. Size closers to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Size all other door closers to allow for reduced opening force not to exceed 5 lbs.

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

L. Closers shall be furnished complete with all mounting brackets and cover plates as required by door and frame conditions, and by adjacent hardware.

M. Door closers shall be provided with a powder coat finish to provide superior protection against the effects of weathering. Powder coat finish shall successfully pass a 100-hour salt spray test.

2.11 KICK PLATES AND MOP PLATES

A. Furnish protective plates as specified in hardware groups.

B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified, metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.

C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be beveled 4 sides and counter sunk.

D. Protection plates over 16" shall not be provided for labeled doors unless specifically approved by door manufacturers listing. When protection plates over 16″ are provided for labeled doors, the plate shall be labeled.

E. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide edges with cutouts as required adjacent hardware.

F. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for cylinders or other mortised hardware.

2.12 OVERHEAD STOPS

A. Acceptable manufacturers and respective catalog numbers:

	Glynn-Johnson	Rixson	Sargent
1. Heavy Duty Surface Mount	GJ900 Series	9 Series	590
2. Heavy Duty Concealed Mount	GJ100 Series	1 Series	690

B. Unless otherwise specified, furnish GJ900 series overhead stop for hollow metal or 1-3/4" solid core doors equipped with regular arm surface type closers that swing more than 140 degrees before striking a wall, for hollow metal or 1-3/4" solid core doors that open against equipment, casework, sidelights, or other objects that would make wall bumpers inappropriate, and as specified in hardware groups.

C. Furnish sex bolt attachments for wood and mineral core doors unless doors are supplied with proper reinforcing blocks.

D. Provide special stop only ("SE" suffix) overhead stops when used in conjunction with electronic hold open closers.

E. Do not provide holder function for labeled doors.

2.13 WALL STOPS AND HOLDERS

A. Acceptable manufacturers and respective catalog numbers:

	Ives	Hager	Burns
1. Wrought Convex Wall Stop	WS406CVX	232W	570
2. Wrought Concave Wall Stop	WS406CCV	236W	575
3. Automatic Wall Holder	WS40	326W	533

B. Furnish a stop or holder for all doors.

C. Provide concave style wall stop at all adjacent integral push button locks; provide convex style wall stop at all other locations.

D. Where wall stops are not applicable, furnish overhead stops.

E. Furnish floor stops or hinge pin stops only where specified in hardware sets.

F. Do not provide holder function for labeled doors.

2.14 MAGNETIC HOLD OPENS

A. Acceptable manufacturers and respective catalog numbers:

	LCN	ABH	Edwards
1. Wall Holder	SEM 7800	2000	1500

B. Magnetic hold opens shall be independently certified by ANSI for compliance with ANSI A156.15, Grade 1 (2006).

C. Magnetic holder's housing and armature shall be constructed of a die cast zinc material.

D. Provide types as listed in groups.

E. Where wall conditions do not permit the armature to reach the magnet, provide extensions.

F. Provide proper voltage and power consumption as required by Division 16.

G. Coordinate electrical requirements and mounting locations with other trades.

2.15 WEATHERSTRIP, GASKETING

A. Acceptable manufacturers and respective catalog numbers:

	Zero	Pemko	NGP	Reese
1. Weatherstrip	429	2891_PK	700NA	755
2. Adhesive Gasket	188	S88	5050	797
3. Sweep w/ drip	8198	345_N	C627	354
4. Drip Cap	142	346	16	R201

B. Weatherstrip and gasketing shall be independently certified by ANSI for compliance with ANSI A156.22 (2005).

C. Where specified in the hardware groups, furnish the above products unless otherwise detailed in groups.

D. Provide weatherstripping all exterior doors and where specified.

E. Provide intumescent and other required edge sealing systems as required by individual fire door listings to comply with positive pressure standards UL 10C.

1. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL10C.
    a. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests for Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
2. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
    a. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

F. Provide Zero 188 smoke gaskets at all fire rated doors and smoke and draft control assemblies.

G. Provide gasketing for all meeting edges on pairs of fire doors. Gasketing shall be compatible with astragal design provided by door supplier as required for specific fire door listings.

2.16 THRESHOLDS

A. Acceptable manufacturers and respective catalog numbers:

	Zero	Pemko	NGP	Reese
1. Saddle Thresholds	8655	171	425	S205
2. Half Saddle Thresholds	1674	227	324	S239
3. Interlocking Threshold	74A	114	442-5	T550

B. Thresholds shall be independently certified by ANSI for compliance with ANSI A156.21 (2001).

C. Hardware supplier shall verify all finish floor conditions and coordinate proper threshold as required to ensure a smooth transition between threshold and interior floor finish.

D. Threshold Types:

1. Unless otherwise specified, provide saddle threshold similar to Zero 8655 for all exterior openings with an interior floor finish less than or equal to 1/4" in height.

2. Unless otherwise specified, provide half saddle threshold similar to Zero 1674 for all exterior openings with an interior floor finish greater than 1/4" in height. Threshold height shall match thickness of interior floor finish.

2.17 ELECTRIC STRIKES

A. Acceptable manufacturers and respective catalog numbers:

	Von Duprin	HES
1. Type 1	6200 Series	4500C Series
2. Type 1	6100 Series	*****

B. Provide electric strikes compatible with the type of locks shown at each opening where specified.

C. Electric strikes shall be UL listed as Burglary-Resistant Electric Door Strikes and where required shall be UL listed as Electric Strike for Fire Doors.

D. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.18 DOOR POSITION SWITCHES

A. Acceptable manufacturers and respective catalog numbers:

	Schlage Electronics	GRI	Sargent
1. Concealed	679 Series	190-12	3287

2.19 FINISHES AND BASE MATERIALS

A. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the following finish schedule:

	HARDWARE ITEM	BHMA FINISH AND BASE MATERIAL
1.	Butt Hinges: Exterior, or Non-Ferrous	630 (US32D - Satin Stainless Steel)
2.	Butt Hinges: Interior	652 (US26D - Satin Chromium)
3.	Continuous Hinges	630 (US32D - Satin Stainless Steel)
4.	Flush Bolts	626 (US26D - Satin Chromium)
5.	Exit Devices	626 (US26D - Satin Chromium)
6.	Locks and Latches	626 (US26D - Satin Chromium)
7.	Pulls and Push Plates/Bars	630 (US32D - Satin Stainless Steel)
8.	Closers	689 (Powder Coat Aluminum)
9.	Protective Plates	630 (US32D - Satin Stainless Steel)
10.	Overhead Stops	630 (US32D - Satin Stainless Steel)
11.	Wall Stops and Holders	630 (US32D - Satin Stainless Steel)
12.	Thresholds	719 (Mill Aluminum)
13.	Weather-strip, Sweeps Drip Caps	Aluminum Anodized
14.	Magnetic Holders	689 (Powder Coat Aluminum)
15.	Miscellaneous	626 (US26D - Satin Chromium)

2.20 KEYING

A. Provide all cylinders in keyways as required to accommodate owners existing Schlage Everest 29 key system.

B. All locks under this section shall be keyed as directed by the owner to an existing Master Key System.

C. Furnish a total of 2 keys per cylinder. Actual cut keys to be determined by owner.

D. Master keys, control keys, and change keys shall be delivered by registered mail to the owner. Construction keys shall be delivered to the contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, installer shall examine door frame installation to ensure frames have been set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed with hardware installation until such deficiencies have been corrected.

3.2 INSTALLATION

A. Before hardware installation, general contractor/construction manager shall coordinate a hardware installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedule, templates and physical products samples.

B. Shim doors as required to maintain proper operating clearance between door and frame.

C. Install all hardware in accordance with the approved hardware schedule and manufacturer’s instructions for installation and adjustment.

D. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Provide blocking or reinforcement for all hardware mounted to drywall construction, including wall mounted door stops and holders.

F. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accord with industry standards.

G. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.

H. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute (TDH-007-20).

I. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.

J. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.

K. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.

L. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the label.

M. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.

N. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.

O. Install wall stops to contact lever handles or pulls. Do not mount wall stops on casework, or equipment.

P. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.

Q. Overhead stops used in conjunction with electrified hold open closers shall be templated and installed to coincide with engagement of closer hold open position.

R. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.

S. Adjust spring power of door closers to the minimum force required to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to ensure opening force does not to exceed 5 lbs.

T. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes.

U. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted seal. Adjust templating for parallel arm door closers, exit devices, etc., as required to accommodate weatherstripping.

V. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.

W. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water-resistant seal.

X. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

3.3 FIELD QUALITY CONTROL

A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware representative shall submit a list of all hardware that has not been installed correctly.

B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware. Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

3.4 ADJUSTMENT AND CLEANING

A. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to and verify proper operation of all door closers and other items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.

3.5 HARDWARE SCHEDULE

A. The following schedule of hardware groups are intended to describe opening function. The hardware supplier is cautioned to refer to the preamble of this specification for a complete description of all materials and services to be furnished under this section.

HW SET 1

1-1/2	PR	HINGES 4.5 X 4.5	5BB1	IVE
1	EA	SPRING HINGE	3SP1	IVE
1	EA	PASSAGE SET	D SERIES SPARTA	SCH
1	EA	DEADBOLT	D871	FAL
1	EA	OH STOP	454S	GLY
1	SET	GASKET	S88 D	PEM

FUNCTION: PASSAGE LATCH
BOTH LEVERS ALWAYS UNLOCKED.

HW SET 4

1-1/2	PR	HINGES 4.5 X 4.5	5BB1	IVE
1	EA	STOREROOM SET	D SERIES SPARTA	SCH
1	EA	WALL STOP	409	RO
1	SET	GASKET	S88 D	PEM
1	EA	KEYING		

FUNCTION: STOREROOM LATCH
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

HW SET 5

1-1/2	PR	HINGES	5BB1	IVE
1	EA	PASSAGE SET	D SERIES SPARTA	SCH
1	EA	WALL STOP	409	RO
1	SET	GASKET	S88 D	PEM

FUNCTION: PASSAGE LATCH
BOTH LEVERS ALWAYS UNLOCKED

END OF SECTION

SECTION 09-0561 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in contract documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.
   2. Carpet tile.
B. Preparation of new concrete floor slabs for installation of floor coverings.
C. Testing of concrete floor slabs for moisture and alkalinity (pH).
D. Patching compound.
E. Moisture mitigation system.

1.02 SUBMITTALS

A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.
B. Adhesive Bond and Compatibility Test Report.
C. Moisture Mitigation Product Data: Manufacturer's published data on each product to be used for mitigation.

1.03 QUALITY ASSURANCE

A. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.
B. Deliver materials in manufacturer’s packaging; include installation instructions.
C. Keep materials from freezing.

1.05 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
   1. Portland cement-based, self-drying, fast setting, trowelable patch for smoothing and repairing concrete floors.
   2. Products:
      a. ARDEX Engineered Cements: ARDEX SD-P Self-Drying, Fast Setting Concrete Underlayment and ARDEX Feather Finish Self-Drying, Cement-Based Finish Underlayment: www.ardexamericas.com
      b. MAPEI; Mapecem Quickpatch and Planiprep FF: www.mapei.com
B. Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC.
C. Moisture Mitigation System: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
   1. Products:

a. ARDEX Engineered Cements; ARDEX MC RAPID with ARDEX FEATHERFINISH: www.ardexamericas.com
b. Koster American Corporation; Koster VAP I 2000 with Koster SL Premium overlay: www.kosterusa.com
c. MAPEI: Planiseal VS and Planiprep FF: www.mapei.com
d. Schonox HPS North America; Schonox EPA and Schonox ZM: www.hpsubfloors.com

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
1. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
2. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
3. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Patching, smoothing, and leveling, as required.
5. Other preparation specified.
6. Adhesive bond and compatibility test.
7. Protection.

B. Moisture Mitigation System Floor Coating, provide at:
1. Areas with seamless sheet flooring.
2. Slab-on-grade concrete to receive new finish flooring with adhesive. Flooring that can be warranted for an MVER of 7 lbs per 1000 sf and a pH between 5 to 11 shall not require coating, unless the moisture vapor emission test results exceed these limits.

3.02 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Test in accordance with ASTM F1869.

C. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

A. Provide in-situ concrete relative humidity testing to all concrete specified to be covered with floor coverings or resinous coatings. Testing shall occur after allowing concrete to dry for a minimum of 28 days. Schedule testing no less than 1 and no more than 6 weeks prior to schedule flooring installation.

B. Test in accordance with ASTM F2170.
1. Use Rapid RH relative humidity and temperature sensor kit manufactured by Wagner Meters, or others as approved.

C. Quantification of Relative Humidity at 40 percent of Concrete thickness.
1. Test of concrete slabs should be maintained at the same temperature and humidity conditions as those anticipated durning normal occupancy. Maintain for 48 hours prior and during test period. If the building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. Include transcript of this information with the test report.
2. The number of in-situ relative humidity test sites is determined by the square footage of the building. The minimum number of tests to be placed is equal to 3 in the first 1000 square feet, and 1 per each additional 1000 square feet.

3. Drill test holes to a depth equal to 40 percent of the concrete slab thickness. Elevated structural slab (not poured in pans) shall be tested at a depth equal to 20 percent of its thickness. Hole diameter shall not exceed outisde diameter of the probe by more than 0.04 inches. Drilling operation must be dry. Use a roto-hammer to drill holes. Vacuum and brush all concrete dust from test hole.
4. Insert a relative humidity probe (sensor) to the full depth of the test hole. Place cap over probe. Allow the test site to acclimate for 24 hours prior to taking relative humidity readings.
5. Remove the cap and insert the cylindrical reading device to obtain reading from the in-situ probe. Read and record temperature and relative humidity at the test site.

D. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09-2116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gypsum board.
B. Tile backer.
C. Concealed blocking in gypsum board assemblies.
D. Acoustical insulation.
E. Joint treatment and accessories.
F. Identification of rated partitions.

1.02 RELATED WORK

A. Section 07-8400 - Firestopping: Sealing top-of-wall assemblies and through-wall penetrations at fire-rated walls.
B. Section 07-9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
C. Section 09-9000 - Painting and Coating: Paint finish.

1.03 ASSEMBLY PERFORMANCE

A. Wall deflection: Minimum framing requirements are indicated. Provide additional framing or support as required to limit deflection as follows, at 5 PSF imposed load applied perpendicular to the sheathing:
    1. Assemblies with plaster or ceramic tile: 1/360 span.
    2. Other assemblies: 1/240 span.
B. Air pressure:
    1. HVAC shaft walls: Sustained loads of 5 lbf/sq ft.
    2. Other locations: 5 lbf/sq ft.
C. For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing laboratory. Products used in the assembly shall bear a classification label from the testing laboratory. Installation shall comply with GA-600 and conform to requirements of the applicable fire-resistive rating.
D. Where a sound transmission rating is indicated, provide an assembly of materials that has been tested and rated according to ASTM E90 by an independent testing laboratory and install materials in conformance with the details of the rated assembly. acoustic ratings usually not indicated

1.04 SUBMITTALS

A. Manufacturer's Product Data for materials and accessories used.
B. Schedule showing framing depths, spacing, gauges, and details at each metal-framed wall and ceiling. For depths or gauges not specified in ASTM C754, furnish manufacturer's span tables, verifying compliance with deflection requirements.

1.05 QUALITY ASSURANCE

A. Comply with applicable regulations and the following.
    1. GA-216 - Application and Finishing of Gypsum Panel Products.

1.06 SITE CONDITIONS

A. Maintain ambient temperature above 55 degrees F beginning at least 24 hours before application of joint treatment or coatings; maintain until all materials are dry.
B. Provide adequate ventilation during and following application of adhesives and joint treatment. Provide temporary air circulators in enclosed areas lacking natural ventilation.
C. Under slow drying conditions, allow additional drying time between coats of joint treatment. During hot dry weather protect installed materials from drafts to prevent too rapid drying.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers, gypsum board:

1. CertainTeed Corp: www.certianteed.com
2. Georgia-Pacific: www.gpgypsum.com
3. National Gypsum Company: www.nationalgypsum.com
4. USG Corporation: www.usg.com

2.02 METAL SUPPORT MATERIALS

A. Studs: ASTM C645, runners and track to match; heavier sections where indicated or where required to achieve deflection limits. Framing members of same equivalent gauge as standard framing, certified by third-party testing with gypsum board per ICC ES AC86, are acceptable, subject to compliance with deflection and rating requirements.
   1. Walls with ceramic tile: 20 gauge minimum; equivalent gauge framing not acceptable.
   2. Walls without ceramic tile or lead shielding through 8 feet tall: 3-5/8 inches deep unless otherwise indicated. 25 gauge minimum.
   3. Height greater than 8 feet: 20 gauge minimum. Provide deeper framing as required for height.

B. Furring members:
   1. Hat, C-shape: ASTM C645, 0.0179 inch thick, hat shaped, C-shaped if spanning more than 4 feet.
   2. Z-shaped: 1-1/4 inches wide face flange, 7/8 inch wide attachment flange, 0.018 inch thick, depth as required for insulation thickness. Provide where indicated, and for attachment to monolithic concrete or masonry walls.

C. Zinc coating at framing in wet walls: ASTM A653, G60 zinc coating.

D. Zinc coating at framing in showers, janitor closets, kitchens: ASTM A653, G90 zinc coating.

E. Ceiling support runners: 1-1/2 inches steel C channels, hot or cold formed, sized to comply with ASTM C754, unless otherwise indicated on the Drawings.

F. Hanger wire: Galvanized carbon steel wire, ASTM A641, soft temper, Class I coating. Size in accordance with ANSI A42.4.

G. Anchoring devices: ANSI A42.4 applicable to substrate, sized to support at least 3 times the calculated load.

H. Top of wall assembly: Mechanically attached to structure, able to: maintain lateral load resistance, accommodate vertical movement, maintain framing spacing, and prevent rotation of framing members.

I. Rated deflection track: UL or WH classified for moving joints, with indicated fire-resistive rating.
   1. ClarkDietrich, Chester, OH.
   2. FireTrak, Watkins, MN.
   3. Metal-Lite, Crossville, TN.
   4. Other as approved.

J. Design deflection: 1/2 inch maximum along, and 24 inches on each side of, column grid lines, and within 24 inches of exterior walls. Provide rated deflection track at of rated walls and rated partitions at other locations.

K. Metal Backing Plate: 6 inch, 20 gage.

2.03 GYPSUM BOARD

A. Gypsum board, paper-faced: ASTM C1396, Type X. Backing board, ceiling board, coreboard, shaftliner, and water-resistant. Exposed face long edges: Tapered. Provide Type C if required for assembly rating.

B. Gypsum panels, glass mat-faced: ASTM C1658, Type X. Glass mat interior gypsum panel, glass mat coreboard and shaftliner, glass mat water-resistant gypsum panel.

C. Mold resistant board: ASTM D3273 score: 10.

D. Size: 48 inches wide by thickness indicated, maximum lengths practicable to minimize number of end joints.

E. Flexible Gypsum Board:
   1. Application: Radiused wall surfaces.
   2. Mold Resistance: Score of 10 when tested in accordance with ASTM D3273.
   3. Thickness: 1/4 inch, two layers (or wet bending of 5/8 inch, single layer).
   4. Edges: Slightly tapered.

2.04 TILE BACKER

A. Acceptable products, wet areas: CertainTeed GlasRoc Tile Backer, CertainTeed GlasRoc Diamondback Tile Backer, Georgia-Pacific Dens-Shield Tile Backer, National e2XP Tile Backer, USG Fiberock Aqua Tough Tile Backerboard.

B. Acceptable products, non-wet areas: ASTM C1396.

C. Fasteners: Screws, size and type recommended by board manufacturer.

D. Joint treatment: Tape and joint cement finishing system recommended by board manufacturer.

E. Building wrap: ASTM E1677, Type I, non-perforated. DuPont Tyvek or approved. Building wrap tape as recommended by building wrap manufacturer.

2.05 BLOCKING

A. Blocking: Use blocking recommended by manufacturer of item to be supported. If not recommended, use one of the following.

1. Wood blocking: SPIB, WCLIB, or WWPA, No. 2 or standard grade, S4S. 2 by 6 minimum, fire-retardant treated.
2. Steel backing plate: Minimum 6 inches tall by 20 gauge, Fy 50KSI steel.

B. Verify blocking is adequate to support design load specified by manufacturer of supported items.

2.06 ACCESSORIES

A. Drywall accessories, general: ASTM C1047.

B. Fasteners:

1. Steel framing less than 0.03 inch thick: ASTM C1002, Type appropriate for member receiving the fastener.
2. Steel framing 0.033 to 0.112 inch thick: ASTM C954.

C. Trim beads: Standard corner beads, J-trim, L-trim, and control joints as indicated or required; galvanized steel with knurled nailing flanges and raised bead.

D. Joint treatment: ASTM C475, perforated tape and joint cement finishing system recommended by gypsum board manufacturer.

E. Laminating adhesive: As recommended by gypsum board manufacturer for conditions of use.

F. Joint compound, for work after Substantial Completion: Low-dust compound, mold-resistant for mold-resistant gypsum board. National Gypsum ProForm XP Ready Mix Joint Compound With Dust-Tech or approved.

G. High-build drywall surfacer: Vinyl acrylic latex-based coating for spray application, to take the place of skim coating and separate paint primer in achieving Level 5 finish. USG Tuff-Hide Primer-Surfacer, or approved.

H. Wall expansion joint: One-piece control joint formed with V-shaped slot, slot opening covered with removable strip.

I. Decorative trim: Extruded aluminum, alloy 6063, temper T-5. Acceptable manufacturers: Fry Reglet Corporation, Gordon Inc, other as approved. Design is based on indicated Fry Reglet products.

1. Factory fabricated and assembled intersections: Reveal moldings mitered and heliarc-welded fabricated intersection units in [T", "L", "+", outside corner, and inside corner shapes.
2. End caps: Same material as reveals, with or without flange where conditions require appropriate termination.

2.07 ACOUSTICAL CONTROL ACCESSORIES

A. Acoustical insulation: ASTM C665, Type I or Type II Class A, friction fit, thickness as indicated.

B. Acoustical sealant: ASTM C834, one-part, acrylic-latex; non-shrinking, non-drying, non-migrating, non-staining, mildew resistant, permanently elastic, paintable; recommended for exposed interior applications involving joint movement of plus or minus 7.5 percent. Foam sealants are not acceptable.

C. Fiber insulation support: Metal insulation clips, metal wire.

2.08 IDENTIFICATION OF RATED PARTITIONS

A. General: Provide permanent signs or stencils to identify fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions, and other walls required to have protected openings or penetrations.

B. Letters: Minimum 3 inches tall, minimum 3/8 inch wide strokes.

C. Font: Arial, or other sans serif font as approved.

D. Label content: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS".

PART 3 EXECUTION

3.01 INSTALLATION - METAL SUPPORT MATERIALS

A. Install runner tracks at floors, walls, ceilings, and columns where stud system abuts other work. Align accurately and fasten to substrate 24 inches o.c. and at corners and intersections.

B. Install rated deflection track at top of fire rated gypsum drywall walls and partitions.

C. Install framing and furring at 16 inches o.c. unless otherwise noted.

D. Install double studs at each side of door and window openings. Install horizontal bracing from doubled studs to next adjacent stud as follows:

1. At each side of opening head.
2. At each side of opening at same height as strike.

E. Install studs plumb, secure to runners. Extend framing from floor to bottom of floor or roof above, unless otherwise indicated.

F. Install ceiling suspension main runners 48 inches o.c. with hangers not exceeding 48 inches spacing along runners. Attach hangers to structure; do not hang from ducts, pipes, or conduit.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

A. Install acoustic accessories at all partitions with acoustical insulation.

B. Acoustical Insulation:

1. Install acoustical insulation continuously between studs in partitions with acoustic insulation. Cut and fit around obstructions. Install insulation support as required to permanently hold insulation in place.
2. Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
3. When resilient channels are installed, acoustical insulation shall not contact the gypsum board mounted to the resilient channel side of the partition.

C. Electrical Outlets:

1. Locate outlets in alternate stud cavities and use separate conduit for outlets on opposite side of the same partition.
2. Electrical boxes can be rigidly mounted to studs with standard mounting brackets. Do not allow box, mounting brackets, or conduit to touch the resilient channels. Electrical boxes are not permitted in walls exceeding a two hour fire rating unless walls are so tested.
3. Allow minimum 1/8 inch space between electrical box and gypsum board, fill gap with acoustical sealant.
4. Before installing gypsum board panels or acoustical insulation, apply minimum 1/16 inch thickness of acoustical sealants over knockouts or other small holes in the electrical boxes to ensure that they are air tight. If a knockout is missing, wrap with tape and cover with acoustical sealant to at least 1/8" thick. Inspect back sealing of boxes before the acoustical insulation and gypsum board panels are installed.

D. Acoustical Sealant: Install per ASTM C919 and as follows:

1. Place one bead continuously on substrate before installation of perimeter framing members.
2. Place continuous bead at perimeter of each layer of gypsum board.
3. Install acoustic sealant at joints in shaft wall and between shaft wall and adjacent construction.
4. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.03 CONCEALED BLOCKING

A. Install supplementary framing, blocking, and bracing where indicated or required for support of fixtures, equipment, casework, or similar work requiring attachment to wall.

3.04 INSTALLATION - GYPSUM WALLBOARD

A. Do not proceed until work that will be concealed by sheathing application has been completed.

B. Install gypsum board with true, even surfaces, and straight sharp corners. Discard damaged or damp boards. Use full length boards where possible. Locate exposed end-butt joints as far from center of wall or ceiling as possible and stagger in alternate courses. Locate either edge or end joints over supports. Joints on opposite sides of partition shall not occur on the same support. Do not place tapered edges against cut edges or ends. Do not locate joints within 8 inches of edge of openings.

C. Butt boards together but do not force into place. Install board on both faces of stud framing extending above furred ceilings unless otherwise noted. Fasten board to framing with mechanical fasteners 12 inches o.c. at supports.

D. For double layer construction, apply face layer with joints offset from base layer.

E. For adhesive applications, precut and prefit face panels. Spread adhesive uniformly over entire back side of panels using a spreader recommended by the board manufacturer. After setting panel in place, apply moderate pressure over entire surface of board and install temporary nails or screws to hold in place until adhesive sets. Remove excess adhesive. Remove temporary fasteners after adhesive has set.

F. Seal perimeter joints and void spaces with acoustical sealant at electrical boxes, registers, ducts, and other penetrations in partitions indicated to receive sound attenuation blankets, in accordance with ASTM C919.

G. Install rated partition identification signs or stencils above the ceiling at 20 foot intervals, and within 15 feet of the end of each wall.

3.05 CONTROL JOINTS

A. Install control joints where indicated on the Drawings. If not indicated, install at 30 feet o.c. maximum vertically and horizontally.

B. Install at each corner of window and door openings where the distance from that corner to the next frame or control joint is more than 20 feet. Extend 6 inches above ceiling.

3.06 DRYWALL FINISHING

A. Tape and finish exposed surfaces, including glass fiber-reinforced column covers with monolithic joints. Allow at least 24 hours between coats. Fill joints around pipes, electrical boxes, ducts, and other items penetrating gypsum board. Comply with GA-214; provide following finish levels.

1. Exposed glass mat faced: Level 5.
2. Surfaces scheduled to receive gloss paint or wall covering: Level 5.
3. Concealed surfaces: Level 2.
4. Other surfaces: Level 4.

B. For Level 5 finish, apply high build drywall surfacer over entire surface after achieving Level 4 finish, to provide a flat, smooth finish without tool marks.

3.07 INSTALLATION OF DRYWALL TRIM ACCESSORIES

A. Where feasible, use the same fasteners to anchor trim as required to fasten gypsum board to the supports.

B. Install metal bead where drywall abuts other types of materials, and where edge of gypsum board would otherwise be exposed or semi-exposed.

1. Metal corner bead at outside corners.
2. "L" bead where work is tightly abutted to other construction.
3. "U" bead where edge is exposed, revealed, gasketed, or sealant-filled, including firestop locations and expansion joints.

END OF SECTION

SECTION 09-3000 - TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor and other horizontal applications.
B. Tile for wall and other vertical applications.
C. Ceramic accessories.
D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 09-2116 - Gypsum Board Assemblies: Tile backer board.

1.03 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets for each product and accessory. Include instructions for using grouts and adhesives.
B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
C. Three inches long samples of standard grout colors for selection.
D. Tile samples: One full size sample of each tile and each accessory, in each finish.
E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than 10 square feet of each type.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.
B. Installer: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.
B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials. Maintain higher temperature if recommended by manufacturer.

PART 2 PRODUCTS

2.01 TILE

A. Acceptable products: As indicated on Finish Schedule.
B. Ceramic Mosaic Tile: ANSI A137.1, standard grade.
C. Glazed Wall Tile: ANSI A137.1, standard grade.
D. Porcelain Tile: ANSI A137.1, standard grade.

2.02 TRIM AND ACCESSORIES

A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
B. TS Non-Ceramic Trim: As indicated on Finish Schedule.
    1. Manufacturers:
        a. Schluter-Systems: www.schluter.com
C. Thresholds: Solid surface material (SSM), color as as indicated in the Finish Schedule.
D. Threshold profile: As indicated on Drawings to provide smooth transition between floor finishes. Edges cut vertical, without bevel, top of each edge flush with adjacent finish floor.

2.03 SETTING MATERIALS

A. Acceptable manufacturers:
    1. Custom Building Products: www.custombuildingproducts.com

2. LATICRETE International, Inc: www.laticrete.com
3. MAPEI Americas USA; www.mapei.com/us

B. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
1. Applications: Floors, other horizontal surfaces. Walls in toilet rooms, locker rooms, vestibules, kitchens.

C. Organic Adhesive: ANSI A136.1, thinset mastic type.
1. Applications: Walls not indicated to receive other bond coat.
2. Products:
a. Custom Building Products; ReliaBond Ceramic Tile Adhesive - Type 1: www.custombuildingproducts.com
b. LATICRETE International, Inc; LATICRETE 15 Premium Mastic: www.laticrete.com

2.04 GROUTS

A. Acceptable manufacturers:
1. Custom Building Products: www.custombuildingproducts.com
2. LATICRETE International, Inc: www.laticrete.com
3. Mapei: www.mapei.com/us

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Colors: As indicated on Finish Schedule.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Colors: As indicated on Finish Schedule.
2. Products:
a. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: www.custombuildingproducts.com
b. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com

2.05 ACCESSORY MATERIALS

A. Sloped Fill:
1. Application: Recessed showers at elevated slabs. Installed under waterproofing to obtain required slope.
2. Products:
a. ARDEX Engineered Cements; Feathered Finish: www.ardexamericas.com
b. Custom Building Products; SpeedFinish: www custombuildingproducts.com
c. Mapei; Mapecem Quickpatch or Planitop 330 Fast: www.mapei.com/us
d. Merkrete; ProPatch A1: www.merkrete.com
e. TEC; Feather Edge Skim Coat: www.tecspecialty.com

B. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.
1. Application: Thick mortar bed to provide required slope.
2. Products:
a. ARDEX Engineered Cements; A 38: www.ardexamericas.com
b. Custom Building Products; SpeedSlope: www.custombuildingproducts.com
c. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com
d. Mapei; Topcem Premix or 4:1 Mud Bed Mix: www.mapei.com/us
e. Merkrete, by Parex USA, Inc; Merkrete Underlay C: www.merkrete.com
f. TEC; Floor Patch Pro: www.tecspecialty.com

C. Waterproofing Membrane: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Crack Resistance: No failure at 1/8 inch gap, minimum; comply with ANSI A118.12.
2. Liquid Membrane Waterproofing:

a. Products:
1) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com
2) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com
3) Mapei; Mapelastic AquaDefense: www.mapei.com/us
b. Accessories:
1) Reinforcing Fabric: Same manufacturer as liquid waterproofing. For use at all changes in plane.

3. Sheet Membrane Waterproofing:
a. Products:
1) LATICRETE International, Inc; LATICRETE HYDRO BAN Sheet Membrane: www.laticrete.com
2) Mapei; Mapeguard WP200: www.mapei.com/us
3) Noble Company; NobleSeal TS: www.noblecompany.com
b. Accessories:
1) Preformed Corners: Same manufacturer as sheet membrane waterproofing.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect surrounding work from damage.
B. Vacuum clean surfaces and damp clean.
C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.02 INSTALLATION - GENERAL

A. Install products and accessory materials in accordance with applicable requirements of ANSI A108.1A through A108.13, manufacturer's instructions, and TCNA recommendations. Use epoxy grout where indicated.
B. Comply with manufacturers' instructions. Follow manufacturer's instructions for linear drain installation. Coordinate with application of waterproofing membrane and plumbing rough-in.
C. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
F. Form internal angles square and external angles bullnosed.
G. Install ceramic accessories rigidly in prepared openings.
H. Install non-ceramic trim in accordance with manufacturer's instructions.
I. Install thresholds where indicated.
J. Sound tile after setting. Replace hollow sounding units.
K. Keep control and expansion joints free of mortar, grout, and adhesive.
L. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
M. Grout tile joints unless otherwise indicated. Use polymer-modified grout unless otherwise indicated.
N. At changes in plane and tile-to-tile control joints, use joint sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
O. Install movement joints as detailed in the TCNA Handbook.

3.03 INSTALLATION - HORIZONTAL SURFACES - THIN-SET METHODS

A. Over concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat,.

3.04 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

3.05 CLEANING

A. Clean tile and grout surfaces.

3.06 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09-5100 - SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.03 SUBMITTALS

A. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

B. Manufacturer's Product Data for suspension system and installation accessories.

C. Manufacturer's Product Data for each type of acoustical unit, clearly stating the acoustic properties.

D. Samples: Submit one sample of each acoustical unit, 12 inches square, with two adjacent factory edges, illustrating material and finish of acoustical units.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Acoustical Units: 48 sq ft of each type and size (box of 12 each).

1.04 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.05 FIELD CONDITIONS

A. Open packages and store in the area where they are to be installed at least 24 hours before installation.

B. Maintain temperature and humidity recommended by manufacturer in storage and installation areas, minimum 60 degrees F ambient temperature and maximum relative humidity of 40 percent [48] hours prior to, during, and 24 hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable acoustic units: As indicated on Finish Schedule.

B. Acceptable manufacturers, suspension systems:

1. Same as for acoustical units.
2. Armstrong World Industries, Inc: www.armstrongceilings.com
3. CertainTeed Corporation: www.certainteed.com
4. USG: www.usg.com

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

1. VOC Content: Certified as Low Emission by one of the following:
   a. Product listing in UL (GGG).
   b. Product listing in CHPS (HPPD).

2.03 SUSPENSION SYSTEMS

A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required for complete installation.

B. Exposed Steel Suspension System: Formed galvanized steel, commercial quality cold rolled; intermediate-duty Hook on cross tees.

1. Profile Tee, 15/16 inch wide face.
2. Construction: Double web.
3. Finish: White painted.
4. Basis of Design: As indicated on Finish Schedule.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.

C. Hold-Down Clips: At Vestibules, exterior doors, and other areas noted on reflected ceiling plans.
1. Products:
a. USG; Hold Down Clip, Q2.

D. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

E. Touch-up Paint: Type recommended by acoustic unit manufacturer, color to match exposed surfaces of acoustical and grid units.

PART 3 EXECUTION

3.01 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system according to reflected ceiling plan.

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Install in bed of acoustical sealant.
2. Use longest practical lengths.

E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

F. Hang suspension system from structural members only, independent of walls, columns, ducts, pipes, and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Use longest practical lengths.
2. Miter corners with hairline joint.
3. Use touch-up paint to paint cut edges.

3.02 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units: Scribe and cut panels accurately at borders and penetrations to uniform width of 1/8 inch to 3/8 inch from face of penetrating material. Install acoustical units so no voids or raw panel edges are visible
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Use touch-up paint to paint exposed reveals and edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Paint cut edges of ceiling panels and cut edges of grid with edge paint. Remove drips and sags, and remove paint from exposed surfaces of ceiling panels and grid.

I. Install hold-down clips on panels within 20 ft of exterior doors, and as noted on Reflected Ceiling Plan.

3.03 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum variation from plumb of eccentrically loaded grid members: 2 degrees.

END OF SECTION

SECTION 09-6500 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient base.

1.02 RELATED REQUIREMENTS

A. Section 09-0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing.

1.03 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

C. Verification Samples: Submit one sample, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.

D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Flooring Material: 24 square feet of each type and color.
2. Extra Wall Base: 20 linear feet of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

1.05 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable products: As indicated on Finish Schedule.

2.02 FLOORING MATERIAL PROPERTIES

A. Fire resistance. Critical radiant flux, ASTM E648 or NFPA 253: Minimum 0.45 watts per square centimeter.

2.03 SHEET FLOORING

A. RF2 Sheet Flooring: Homogeneous without backing, with color and pattern throughout full thickness.

1. Basis of design: As indicated on Finish Schedule.
2. Minimum Requirements: Comply with ASTM F1913.
3. Thickness: 0.080 inch nominal.
4. Seams: Heat welded.
5. Integral coved base with cap strip.
6. Welding Rod: Solid bead in material comparable with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

B. RF1 Sheet Flooring[<>]: Heterogeneous with Class A, fused non-cushioned textured backing system.

1. Basis of design: As indicated on Finish Schedule.
2. Minimum Requirements: Comply with ASTM F1303.
3. Classification: Type I, Grade 1 Wear Layer: Embossed clear wear layer of 20 mils for Commercial Use.
4. Thickness: 2.3mm nominal; non-cushioned.
5. Top Coat: HP Urethane coating with ceramic bead.
6. Seams: Heat welded.
7. Integral coved base with cap strip.

8. Welding Rod: Solid bead in material comparable with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

C. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.04 RESILIENT BASE

A. RB Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Basis of design: As indicated on Finish Schedule.
   2. Height: 4 inch.
   3. Thickness: 0.125 inch.
   4. Finish: Satin.

2.05 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. TS Transition Strip: Provide patching compound and tape to feather edge under resilient flooring to make smooth, flush transition between flooring types.

D. TS Moldings, Transition and Edge Strips:
   1. Basis of Design: As indicated on Finish Schedule.

E. Filler for Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

A. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
   1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, recommendations, and bulletins.

B. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

C. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

D. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

A. Lay flooring with joints and seams in accordance with seaming plan. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.

B. Seal seams by heat welding where indicated.

C. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

3.05 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints. Use coil stock in longest lengths practicable.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09-9000 - PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and other coatings.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.

D. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
2. Stainless steel or plated metal finishes.
3. Plastics, acoustical materials, face brick, stonework, chalkboards, and other surfaces not normally requiring a painted finish.
4. Items indicated to receive other finishes.
5. Items indicated to remain unfinished.
6. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
7. Floors, unless specifically so indicated.
8. Glass.
9. Concealed pipes, ducts, and conduits.

1.02 SUBMITTALS

A. Product Data: Provide complete list of all products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified. Use uncoated draw down cards.

1. Where sheen is specified, submit samples in only that sheen.

C. Finish Schedule: Include all surfaces to be painted, manufacturer, type and color to be applied to each surface.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Paint and Coatings: of each ; store where directed.
2. Label each container with in addition to the manufacturer's label.

1.03 MOCK-UP

A. Provide panel, 3 feet long by 3 feet wide, illustrating verification of coating color, texture, and finish.

B. Provide sample panels of each color requested by Owner or Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of and a maximum of , in ventilated area, and as required by manufacturer's instructions.

1.05 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Provide all paint and coating products from the same manufacturer .

C. Paints:

1. Sherwin Williams Company: www.sherwin-williams.com
2. Benjamin Moore & Co: www.benjaminmoore.com
3. PPG Paints: www.ppgpaints.com

D. Primer Sealers: Same manufacturer as top coats.

E. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each coating material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

1. Gypsum Board: Interior Latex Primer Sealer; MPI #50 X-Green.
2. Concrete: Same as top coats.
3. Concrete Masonry: Interior/Exterior Latex Block Filler; MPI #4 X-Green.
4. Steel, Uncoated: Interior Rust-Inhibitive Water Based Primer.
5. Galvanized Steel: Interior Water Based Galvanized Primer.
6. Architecturally Exposed Structural Steel: Shop applied epoxy primer.

C. Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

D. Sheens: Provide sheens specified.

1. Flat: 0 to 9 units @ 85 degrees. MPI Gloss Level 1.
2. Eggshell: 10 to 24 units @ 85 degrees. MPI Gloss Level 3.
3. Satin: 25 to 29 units @ 60 degrees. MPI Gloss Level 4.
4. Semi-gloss: 30-45 units @ 60 degrees. MPI Gloss Level 5.
5. Gloss: 70 units minimum @ 60 degrees. MPI Gloss Level 6.

E. Colors: As indicated on drawings PNT number designations are for color only. Paint Systems listed below do not correspond to color.

1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint System 4 All Interior Gypsum Board surfaces indicated to be painted, unless noted otherwise.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143-148 X-Green.
   3. Flat: MPI gloss level 1; use this sheen where indicated.
   4. Eggshell: MPI gloss level 3; use this sheen where indicated.
   5. Semi-Gloss: MPI gloss level 5; use this sheen where indicated.
   6. Primer(s): As recommended by manufacturer of top coats.

B. Paint System 5 Interior Gypsum Board surfaces in Wet Areas, Service Areas, and Toilet Rooms indicated to be painted, unless noted otherwise, and where HPNT is indicated:
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex, MPI #115.
   3. Semi-Gloss: MPI gloss level 6; use this sheen at all locations.
   4. Primer(s): As recommended by manufacturer of top coats.

C. Paint System 6 All Interior Ferrous Metal, Primed Metal, zinc-coated metal, and aluminum surfaces indicated to be painted, unless noted otherwise.
   1. Two top coats and one coat primer.
   2. Primer(s): As recommended by manufacturer of top coats.
   3. Top Coat(s): Interior Light Industrial Coating, Water Based, MPI #153-154.
   4. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: filler.

C. Fastener Head Cover Material: filler.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of and bleach. Rinse with clean water and allow surface to dry.

F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

3.02 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Sand metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.03 SCHEDULE - PAINT SYSTEMS

A. Galvanized Steel: Finish all surfaces exposed to view.
   1. Interior: Paint System 6, Semi-Gloss.

B. Gypsum Board
   1. Interior Ceilings and Bulkheads: Paint System 4, Flat.
   2. Interior Walls: Paint System 4, Egshel.

C. Gypsum Board (Wet Areas), CMU, and where HPNT is indicated
   1. Interior Ceilings and Bulkheads: Paint System 5, Egshel.
   2. Interior Walls, Wainscots: Paint System 5, Egshel.

D. Steel Doors and Frames
   1. Interior: Paint System 6, Semi-Gloss.

END OF SECTION

SECTION 10-2123 - CURTAIN CUBICLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface mounted overhead curtain track and guides.

B. Cubicle curtains.

1.02 RELATED REQUIREMENTS

A. Section 09-5100 - Suspended Acoustical Ceilings: Suspended ceiling system to support track.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's product data and installation instructions, for track system characteristics.

B. Shop Drawings: Indicate a reflected ceiling plan view of curtain track layout, number of carrier hangers, anchorage and suspension points, attachment details, conditions requiring accessories, and schedule of curtain sizes. Indicate dimensions taken from field measurements. Include details of blocking above ceiling.

C. Samples: Submit 12 by 12 inch sample patch of curtain cloth with representative top, bottom, and edge hem stitch detail, heading with reinforcement and carrier attachment to curtain header.

D. Samples: Submit 12 inch sample length of curtain track including typical splice, wall and ceiling hanger, curtain carrier, and escutcheon.

E. Samples: Curtain carrier, full-size unit.

F. Manufacturer's Installation Instructions: Indicate any perimeter conditions requiring special attention.

G. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.

1.04 QUALITY ASSURANCE

A. Installer shall be a firm experienced in installation of systems similar to those specified, having successfully completed five (5) comparable scale projects.

B. Manufacturer shall have five (5) years experience in the production of specified products.

1.05 FIELD CONDITIONS

A. Do not install cubicles until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceiling is complete, and ambient temperature and humidity conditions are maintained at levels for intended use.

B. Do not install curtains until all work within spaces are complete.

1.06 MAINTENANCE MATERIALS

A. Furnish ten (10) additional carriers.

B. Furnish one (1) complete set of additional curtains.

C. Label with manufacturer's name, project identification, and date of delivery. Deliver to the site and store where directed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept curtain tracks, curtain carriers, and curtain materials on site and inspect for damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cubicle Track and Carriers:

1. A. R. Nelson Co: www.arnelson.com
2. C/S General Cubicle: www.c-sgroup.com/cubicle-track-curtains
3. Imperial Fastener Co., Inc: www.imperialfastener.com
4. Inpro: www.inprocorp.com
5. Other as approved.

2.02 TRACKS AND TRACK COMPONENTS

A. Tracks: Extruded aluminum sections; one piece per track run.

1. Profile: Channel.
2. Mounting: Surface.

3. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
4. Track End Stop, Tees, Y's, and Switches: To fit track section.
5. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
6. Fasteners: Stainless steel.
7. Finish on Exposed Surfaces: White enamel finish.
8. Products:
    a. Basis of Design: A.R. Nelson Track No. 1200.

B. Curtain Carriers: Nylon roller to accurately fit track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal; 2.2 carriers per foot of track length.
1. Basis of Design: A.R. Nelson No. 20 Breakaway Carrier.

C. Installation Accessories: Types required for specified mounting method and substrate conditions.

2.03 CURTAINS

A. CC1 Cubicle Curtains:
1. Flame spread, 100 percent inherently flame resistant with index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84, as required by applicable code.
2. Inherently flame resistant or flameproofed; capable of passing NFPA 701 test.
3. Curtain: Close weave fire-resistant polyester; sanitized, 100 percent washable and preshrunk.
4. Product and Material Color/Pattern: As indicated on Finish Schedule.
5. Length: Track length plus 1 foot.
6. Height: Terminate curtain 15 inches from floor. Include open mesh cloth at top 18 inches of curtain for room air circulation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install curtain track to be secure, rigid, and true to ceiling line.

B. Secure track to ceiling system.

C. Secure track to ceiling system. Fasten at 24 inches o.c. maximum with support at each splice and tangent point of each corner. Center fasteners on track, seat to ensure unencumbered carrier operation. Mechanically fasten track to ceiling as follows:
1. Suspended Ceiling Grid: Screws or manufacturer's clip for grid installation.

D. Install end cap and stop device.

E. Protect installed track openings with non-residue adhesive tape to prevent debris from impeding carrier operation.

F. Install carriers and curtain after final cleaning. Provide curtain carriers adequate for 6 inches spacing along full length of curtain. Adjust for smooth operation.

G. Apply vertical test load of 50 pounds where directed. Visible deflection of track or damage to supports is cause for rejection.

H. Protect installed curtains, replace soiled or damaged curtains prior to final inspection.

END OF SECTION

SECTION 10-2601 - WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corridor handrails.

1.02 SUBMITTALS

A. Product Data: Indicate .

B. Samples: Submit sections of , long, illustrating component design, configuration, color and finish.

1.03 QUALITY ASSURANCE

A. Comply with ICC A117.1 Accessible and Usable Buildings and Facilities.

1.04 SITE CONDITIONS

A. Coordinate work with wall framing to ensure proper location of concealed blocking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wall and Corner Guards:

1. Construction Specialties, Inc: www.c-sgroup.com
2. Inpro: www.inprocorp.com
3. Koroseal Wall Protection Systems: www.koroseal.com

2.02 COMPONENTS

A. HR Corridor Wall Guard Handrails: Factory- or shop-fabricated, with preformed end caps and internal and external corners:

1. Basis of Design: As indicated on Finish Schedule.
2. Performance of Installed Assembly:
   a. Support vertical live load of with deflection not to exceed of span between supports.
   b. Resist lateral force of at any point without damage or permanent set.
3. Material: High impact , color .
4. Surface Burning Characteristics: Provide assemblies with flame spread index of and smoke developed index of , when tested in accordance with ASTM E84.
5. Mounting: Surface.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Install wall protection panels in non-flammable, high strength water based adhesive as recommended by manufacturer.

C. Position top of crash rail as indicated on drawings.

D. Terminate rails 3 inches short of door openings.

E. Coordinate installation of vinyl fabric wall covering with corner guard cover.

3.02 TOLERANCES

A. Maximum Variation From Required Height:

B. Maximum Variation From Level or Plane For Visible Length:

END OF SECTION

SECTION 21 00 60 - FIRE PROTECTION DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SECTION INCLUDES

A. Demolition and removal of all fire protection equipment and distribution conduits including but not limited to piping, controls, and accessories in existing building.

1.03 RELATED REQUIREMENTS

A. General and Supplementary Conditions and other Division 1 Specification Sections apply to this section

1.04 REFERENCE STANDARDS

A. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SUBMITTALS

A. See Division 1 - Administrative Requirements for submittal procedures.

B. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

C. Schedule of selective demolition activities:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of building utility services.
3. Coordination for shutoff, capping and continuation of services.
4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.

D. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.06 PROJECT CONDITIONS

A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48-hour notice to Owner of activities that will affect the Owner's operations.

B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.

C. Owner assumes no responsibility for condition of area to be selectively demolished.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work

E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and existing ductwork and piping arrangements are as shown on Drawings.

B. Verify that abandoned equipment serves only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.

D. Visit the existing building and grounds and review existing building record drawings to familiarize with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the Contractor for any error or negligence on his part.

E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION

A. Disconnect mechanical systems in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by mechanical demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and remove from site and extend existing mechanical work under provisions of this Division and as indicated on the Drawings unless otherwise noted.

B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.

C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.

D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.

E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.

F. Remove all accessories above grade. When removing equipment all associated pipe, etc. shall be removed and capped as required. Cut piping, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.

G. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.

H. Patch all openings created by removal of pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar materials and finish unless otherwise noted.

I. Seal all existing roof penetrations, which will not be reused. Roof patching shall be by project roofing contractor, or an Owner approved roofing contractor.

J. Remove, relocate, or provide brackets, hangers, and other accessories as required.

K. Repair adjacent construction and finishes damaged during demolition and extension work.

L. Maintain access to existing mechanical installations, which remain active.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.

B. All building surfaces damaged and openings left by new Work or the removal or relocation of mechanical equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

SECTION 21 01 00 - FIRE PROTECTION GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section applies to and forms a part of each of the sections of Division 21. This section, and each of the sections to which it applies, is subject to the requirements of the Instructions to Bidders, General Conditions, and Special Conditions of these complete specifications.

B. The work covered by this Division of the Specifications consists of furnishing all labor, supervision, equipment, materials, all incidentals, related items, and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.

C. Only such items as are hereinafter specified or indicated on the drawings to be furnished by others, shall be considered to be furnished by others. All other items are to be considered as a part of this Contract and shall be so bid.

D. The omission of specific reference to any parts necessary to, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from furnishing and installing same.

E. All work shall be finished, tested and ready for operation.

1.02 DEFINITIONS

A. Word "Furnish" where written in Division 21 specifications and drawings shall mean Contractor shall deliver to the site item(s) specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item or items specified.

B. Word "Install" where written in Division 21 specifications and drawings shall mean Contractor shall set in position, connect (including sub-assemblies furnished), and adjust for use. Contractor shall furnish miscellaneous specialty items such as hangers, valves, unions, piping, sheet metal, etc., as obviously necessary for a complete and operating installation.

C. Word "Material" where written in Division 21 specifications and drawings shall mean any and all apparatus, equipment, devices, fixtures, components, products, assemblies, items, parts, things, and any other pieces specified or shown or required.

D. Word "Labor" where written in Division 21 specifications and drawings shall mean any and all physical effort, manpower, time, expertise, tools, equipment, and services to carefully assemble, install and affix all material in a proper, complete and acceptable manner.

E. Word "Provide" where written in Division 21 specifications and drawings shall mean "Mechanical Contractor shall furnish all labor and material and completely and properly install such material and leave same in acceptable condition and intended acceptable working order".

1.03 DISCREPANCIES OR OMISSIONS FROM DRAWINGS OR DOCUMENTS

A. Notify the Engineer of any discrepancies in, or omissions from the drawings or documents. Neither the Owner nor the Architect will be responsible for any oral instructions or modifications of the specifications or drawings. Written interpretations will be made only by Addenda.

B. If discrepancies are not reported, the contractor shall bid the greater quantity or better quality (highest dollar value), and appropriate adjustment will be made after contract award.

C. Discrepancies discovered during construction shall immediately be called to the attention of the Architect/Engineer for clarification.

D. All minor items necessary for the completion and successful operation of the system, whether or not herein definitely specified or indicated on the drawings, shall be furnished, and installed.

E. Omission of/or express reference to any material necessary for/or reasonably incidental to complete installation shall not release Contractor from providing such material. Where material is shown on drawings but is not specified or is specified but not shown, such material shall be considered both shown and specified.

F. Any work not clear to Contractor shall be referred to Engineer for clarification before bid is submitted. If no question is raised prior to opening of bid, Contractor shall be required to provide work in question as directed by Engineer, whose decision is final, without additional charges.

G. By virtue of submitting a bid, Contractor agrees that he is skilled and experienced in use of and in interpretation of drawings and specifications. Contractor further agrees that he has carefully reviewed all drawings, all specifications, and all addenda, which constitute bid documents for this contract, and finds them free of ambiguities and good and sufficient for bidding and construction purposes.

1.04 DRAWINGS

A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Furnish offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.

B. All piping shall be routed so as not to obstruct access to other equipment. Routing indicated on drawings is representative of intended location but shall be field verified. It shall be this contractor's responsibility to coordinate with other trades for accessibility.

C. Any work or system on the roof not explicitly indicated on the roof plan shall be approved by the engineer prior to installing.

D. In general, the mechanical equipment drawings are drawn to scale as noted. Obtain dimensions and locations of partitions, walls, etc., from the Architectural drawings wherever possible and do not scale the mechanical drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling

heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.

E. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.05 SITE INSPECTION

A. Before submitting a proposal for the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themselves with all the existing conditions and limitations, including the extent of demolition, cutting, and patching to be done by the Contractor for Mechanical Work. No extras will be allowed because of the Contractor's misunderstanding as to the amount of work involved, or his lack of knowledge of any condition in connection with the work.

1.06 PRIOR APPROVAL REQUESTS

A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 10 days before receipt of bids.

B. The submission shall provide complete information, test, etc. relating to quality, performance, suitability, to determine acceptability of such products.

C. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known bidders.

D. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.

E. The cost of any changes of other trades as a result of use of the substitution material or equipment must be borne by the Contractor submitting such material or equipment.

1.07 REVIEW OF MECHANICAL MATERIALS AND EQUIPMENT

A. Within thirty (30) days after award of construction contracts, Contractor shall submit for acceptance to the Architect quantity of shop drawings specified for the equipment indicated in these specifications. The shop drawings shall include the equipment manufacturer’s name and address, catalog designation or model number, rough-in data & dimensions, performance curves and rated capacities & operational characteristics.

B. The Contractor shall thoroughly review each item for compliance with these Specifications making any necessary corrections prior to submittal. Each shop drawing set shall be stamped, signed, and dated indicating Contractor review and submitted electronically via PDF file format. The PDF file name shall include the relevant specification section number for reference. If the Contractor fails to properly review shop drawings, the Contractor shall reimburse the Engineer for all additional reviews on a time and material basis.

C. Provide samples of materials or equipment proposed to be furnished, if requested. Samples shall become the property of the Architect/Engineer and will be returned only when accompanied by a written request to do so.

D. None of the items listed shall be purchased, delivered to the site, or installed, until the item is reviewed. No substitution will be permitted after review except where such substitution is considered by the Architect to be in the best interest of the Owner.

E. The Engineer will review all Shop Drawings submitted and will retain a copy for record file.

F. Approval Stamp: This review is to verify general conformance with the design concept of the Project and substantial compliance with the information provided in the Contract Documents. This review does not in any way relieve the Contractor or their suppliers of their responsibility to provide all materials and equipment as specified, in quantities, quality and dimensions required. Submittals will be reviewed with the following actions:

1. "No Exception Noted" indicates that the Submittal appears to conform to the design concept of the Work and that the Contractor, at his discretion, may proceed with fabrication and/or procurement and installation.
2. "Make Corrections Noted" indicates that the Submittal, after noted corrections are made, appears to conform to the design concept of the Work and that the Contractor, at his discretion, may proceed with fabrication and/or procurement and installation, if the corrections are accepted by the Contractor without any increase in Contract Sum or Time.
3. "Revised and Resubmit" indicates that the noted revisions are such that a corrected copy of the Submittal is required for review to confirm that the noted revisions have been understood and made. The Contractor, at his discretion, may proceed with fabrication and/or procurement and installation after submitting a corrected copy and verifying with the reviewer that the corrected copy is acceptable, if the corrections are accepted by the Contractor without an increase in the Contract Sum or Time.
4. "Rejected" indicates that the Submittal does not appear to conform to the specifications, a resubmission is required, and fabrication or procurement is not authorized.

G. If the Engineer rejects (Revised and Resubmit or Rejected) the same section two times the engineer shall be compensated for additional reviews. Any subsequent submittal will require the inclusion of a check made out to the engineer in the amount of $ 500.00. Contractor is responsible for all delays caused by the resubmittal process.

H. Should the contractor fail to comply with any of the requirements of the preceding sub-paragraphs; then the right is reserved by the Architect to select any or all items in the material schedule, with that selection to be final and binding upon the contractor. The materials selected or reviewed, as the case may be, by the Architect, shall be used in the work at no additional cost to the Owner.

I. Connections and equipment clearances are based on the manufacturer scheduled. Any deviations in size, weight, and/or configuration shall be the responsibility of the contractor. Equipment by other approved manufacturers will be acceptable if of a similar type and grade and if of approximately the same general overall dimensions. Quality, construction and performance must be equal to or better than that specified.

J. When the contractor chooses to furnish any reviewed material or equipment that requires electrical specifications/connections (circuit breaker, conduit, wire, labor, etc.) different than shown and/or scheduled on the drawings, or specified in detail, the contractor shall be responsible for coordinating any necessary changes and shall bear the cost of such changes (including engineering costs).
   1. Submit detailed documentation of all required changes, confirmation of coordination with the Electrical Contractor, and an estimated cost breakdown prior to ordering.

K. All contractor requested changes from the design, including size, weight, configuration, and electrical modifications, must be submitted for review and proof of coordination prior to approval.

1.08 PROPOSAL REQUESTS AND INSTRUCTIONS

A. For any proposal request or instruction that requires an adjustment to the Contract Sum, submit an itemized quotation for the change(s) described in the proposed modifications to the Contract Documents. Proposal shall also indicate credits, deducts, and/or offsets for material and labor originally included in contract.
   1. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. Breakdown shall include amounts, lengths, quantities, types, sizes, etc. of material.
   2. Indicate applicable taxes, O&P, delivery charges, equipment rental, and other incidental charges.
   3. Include costs of labor and supervision directly attributable to the change.
   4. All sub-contractor pricing shall include the same breakdown as described above.

1.09 WARRANTY

A. All equipment and installation shall be provided with a 1-year warranty beginning with substantial completion.

B. Refer to individual spec sections for specific warranty information that is different than stated above.

C. Submit warranty with related forms completed in Owner's name and registered with manufacturer.

1.10 MANUALS

A. In addition to catalog data and shop drawings submitted for review, this contractor shall furnish Operation and Maintenance Manuals for the mechanical systems. Manuals shall be delivered to the Architect before final observation of the work.

B. Operation and Maintenance Manuals shall be furnished in PDF electronic format .

C. Provide an index at the beginning of the manual for the sections included in the manual.

D. Include at the front of the manual a complete listing of the Architect, Engineer and contractors and sub-contractors used on the project. Listing shall include names, addresses and phone numbers for each.

E. Manuals shall be arranged in order similar to the specifications. All major pieces of equipment shall be referenced with tabs. At the beginning of each section, the equipment supplier's name, address, and phone number shall be provided.

F. Data for equipment included in the manuals shall include:

1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used.
2. Operations Manuals detailing step by step procedure to follow putting the equipment into operation.
3. Maintenance Manuals from the manufacturer of each piece of equipment including instructions on installation, maintenance, and lubrication. Manuals shall include parts lists for all replacement parts.

G. The following items shall also be included in the manuals for the Owners information: Signed owner instruction forms for all items specified as requiring owners instruction.

H. Operations and Maintenance Manuals shall be submitted to the Engineer for approval prior to delivery to the Architect.

1.11 INSTALLATION OF EQUIPMENT

A. All equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications. Auxiliary piping, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.

1.12 RECORD DRAWING

A. The contractor shall maintain one set of drawings at the job site used as a master copy. Each change order or other revision, deletion, or addition shall be clearly marked and noted by colored pencil. This copy of plans shall be furnished to the Architect upon completion of the project.

B. The contractor shall note on the record drawings the elevations and/or inverts of water service where it exits the building foundation.

C. A complete set of these drawings shall be scanned at a resolution of 600dpi in color and saved in an Adobe PDF portfolio format with index to each sheet by name and burned to a non-volatile media. The electronic copy of the as-built drawings shall be transmitted to the Engineer. After review and approval by the Engineer, the as-built drawings will be turned over to the Owner.

1.13 COOPERATION WITH OTHER TRADES

A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.14 INSPECTION OF SITE

A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themself with all of the existing conditions and limitations. No

extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.15 PAVEMENT, CURB AND SIDEWALK REPLACEMENT

A. This Contractor shall be responsible for replacement of existing street pavement, curbs, and sidewalks, etc., removed or damaged by them during the course of the work, unless such pavement, curbs, sidewalks are to be constructed under the General Contract. The work shall be done in accordance with local requirements.

1.16 CODES, ORDINANCES, REGULATIONS & STANDARDS

A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.

B. All work shall conform to applicable state and local codes, ordinances, regulations and/or standards.

1.17 PERMITS AND LICENSES

A. This contractor shall obtain and pay for all licenses and permits and shall pay for all fees and charges for the connection to outside services and use of property other than the site of the work for storage of materials or other purposes.

B. Contractor shall coordinate and request all inspections from authority having jurisdiction. The Contractor shall notify the Architect of all such coordinated inspections (date & time) and shall submit certificates of inspection and final approval of the local inspection authority.

1.18 TESTS

A. Test all equipment installed under these specifications and demonstrate its proper operation to the Engineer.

B. Do not test or operate equipment for any purpose, until it has been fully lubricated in accordance with the manufacturer's instructions and, if it is a centrifugal pump, until it has been connected to the piping system with sufficient water so that it will not run dry.

C. All testing shall be completed before final inspection, and test results shall be available during the final inspection.

1.19 GUARANTEES

A. This contractor shall guarantee all equipment, material, and workmanship for a period of one year from date of final certificate. Any defects in mechanical equipment, workmanship or materials that appear, or cause trouble of any kind within a period of one year from date of final certificate shall be remedied, free of charge. Refer to other sections of these specifications for guarantees in excess of the requirements herein described.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 21 01 50 - FIRE PROTECTION MATERIALS & METHODS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section covers basic materials and methods and applies to and forms a part of each of the sections of Division 21.

B. This work shall be in accordance with this and other applicable sections and/or provisions of these specifications and with the applicable drawings.

1.02 MATERIALS & MANUFACTURERS

A. All materials and equipment shall be new, free of defects, installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practice of the industry.

B. Certain materials and/or equipment in this specification are specified by manufacturer and catalog numbers. The design was based on the specified equipment and establishes a degree of quality, performance, physical configuration, etc. If the contractor should elect to use equipment other than the equipment used as a basis for design but listed as "acceptable" in the specifications, he shall be responsible for space requirements, configuration, performance, and changes in bases, supports, vibration isolators, structural members, openings in structure and other apparatus that may be affected by its use.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 COORDINATION OF OPENINGS

A. This contractor shall coordinate all openings required for new piping, equipment, controls, etc. through any structural slabs, beams, or walls. Contractor shall request a copy of the precast concrete shop drawings and verify locations and sizes of all openings required.

B. All costs associated with structural field changes or redesigns of the building systems due to lack of field coordination shall be responsibility of this contractor.

3.02 PROTECTION, DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for the delivery and storage of materials and make the required arrangements with other contractors for the introduction into the building of equipment too large to pass through finished openings.

B. Protect materials and equipment stored on site from weather and moisture by maintaining factory covers and/or suitable weather-proof coverings. For extended outdoor storage, motors shall be removed from equipment and stored separately.

C. The open ends of all piping shall be covered whenever that system is not being worked on, i.e. end of the workday, completion of a section, etc. Covering shall keep dust, garbage, vermin, and other foreign objects out of the piping when the contractor is not on the jobsite.

3.03 CUTTING AND REPAIRING

A. All holes and penetrations required for the installation of the fire protection equipment shall be by the fire protection contractor. This shall include all piping and any other penetration through the wall, floor, or roof.

B. Cutting construction shall be done only with the written permission of the Architect. Cutting shall be done carefully and damage to buildings, pipes, wiring, or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved at no additional charge to the Owner. This Contractor shall be responsible for all cutting and patching unless such work has been delegated to the General Contractor.

C. All holes cut into concrete shall be cut by means of power saws or core drills. All unsightly spalls or chips shall be repaired.

D. All openings remaining around pipe penetrations shall be filled, caulked, and painted to match wall. Code approved fire caulking shall be used for all rated penetrations.

3.04 SEALING FLOOR, CEILINGS AND WALL OPENINGS

A. Where pipes pass through walls, ceilings, floors, or partitions, (other than those through fire rated walls or chases) the opening in the construction around the pipe shall not exceed ½ inch average clearance on all sides and shall be sealed to prevent the passage of sound and air. Coordinate wall openings to allow insulation thickness to pass through walls if allowed.

B. The material used to seal space between the wall and the pipe shall be non-combustible caulk type, or wrap type, as conditions require. Provide sheet metal angles or flanges as may be required to contain the stopping material. Use of expanding foam will be allowed if surfaces are cleaned of an excess material and all edges are trimmed smooth. Penetrations through exterior walls shall be sealed weather tight.

C. Acceptable manufacturers shall be Hilti, 3M Brand, or a prior approved product.

3.05 CLEANING AND PAINTING

A. Clear away all debris, surplus materials, etc., resulting from work or operations, leaving the job and equipment furnished under this contract in a clean condition.

B. All equipment being furnished with finished paint coat shall be examined upon job completion for scratches and other surface damage. All finished surfaces where necessary shall be touched up with touch-up paint of color to match the factory finish.

3.06 ASBESTOS FREE BUILDING

A. There shall be no products or building materials used as a temporary or permanent element in the construction of this building, which has in its make-up any form of asbestos. The contractors shall be responsible to monitor shop drawings and product literature to verify the make-up of materials to be used in the building and remind material suppliers that their products must be asbestos free.

B. Notify the Architect immediately of any existing materials which are suspected of containing asbestos. Do not disturb or attempt to remove any asbestos containing material. The Architect will contact the Owner and inform

them of the Contractors observations. The Owner will obtain and provide the services of professionals skilled in asbestos removal.

3.07 SALVAGE

A. All items removed from existing building shall be salvaged in a workmanlike manner.

B. The handling, storage, and disposition of salvage materials shall be as directed by the Architect. Generally, all salvage material shall remain the property of the Owner. Materials and equipment not wanted by Owner shall be removed from the job site and become the property of the contractor.

END OF SECTION

SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Above ground piping.

B. Escutcheons.

C. Mechanical couplings.

D. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

A. ASME A112.18.1 - Plumbing Supply Fittings; 2024.

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.

D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.

E. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.

H. ASTM A536 - Standard Specification for Ductile Iron Castings; 2024.

I. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2024.

J. AWWA C606 - Grooved and Shouldered Joints; 2015.

K. FM (AG) - FM Approval Guide; current edition.

L. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section.

1. Minimum three years experience.

C. Conform to FM (AG) and UL (DIR) requirements.

D. Valves: Bear FM (AG) and UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

F. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Sprinkler-based System:

1. Comply with NFPA 13.
2. See Section 21 13 00.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53, black.

1. Pipe:
   a. 2" and smaller: Schedule 40
   b. 2-1/2" and larger: Schedule 10 where allowed by owner and AHJ
2. Steel Fittings: ASTM A234/A234M wrought carbon steel or alloy steel.
3. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
4. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
5. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.03 ESCUTCHEONS

A. Manufacturers:

1. Fire Protection Products, Inc: www.fppi.com.com.
2. Tyco Fire Protection Products: www.tyco-fire.com.
3. Viking Group Inc: www.vikinggroupinc.com.

B. Material:

1. Fabricate from nonferrous metal.
2. Chrome-plated.
3. Metals and Finish: Comply with ASME A112.18.1.

C. Construction:

1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.04 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 8 inch: Carbon steel, adjustable swivel.

2.05 MECHANICAL COUPLINGS

A. Manufacturers:

1. Tyco Fire Protection Products: www.tyco-fire.com/#sle.
2. Victaulic Company: www.victaulic.com/#sle.

B. Rigid Mechanical Couplings for Grooved Joints:

1. Dimensions and Testing: Comply with AWWA C606.
2. Minimum Working Pressure: 300 psig.
3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
4. Housing Coating: Factory applied orange enamel.
5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Seal exterior wall penetrations above grade weather tight.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Pipe Hangers and Supports:

1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
2. Place hangers within 12 inches of each horizontal elbow.
3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
4. Coordinate anchor locations with structural. In general, support from top, load bearing portion of structural member.

H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.

J. Structural Considerations:

1. Do not penetrate building structural members unless indicated.

K. Provide sleeves when penetrating floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

1. Aboveground Piping:
    a. Pack solid using mineral fiber complying with ASTM C592.
    b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

L. Escutcheons:

1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
3. Attach plates at the underside only of suspended ceilings.
4. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

N. Die-cut threaded joints with full-cut, standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 21 05 53 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Piping: Pipe markers.

2.02 PIPE MARKERS

A. Manufacturers:

1. Brimar Industries, Inc: www.pipemarker.com/#sle.
2. Seton Identification Products, a Tricor Company: www.seton.com.

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Markers shall be applied where pipes pass through walls (both sides of the wall), at each change of direction and on each 20 feet of straight lengths.

1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.

B. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

END OF SECTION

SECTION 21 13 00 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System design, installation, and certification.

1.02 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Engineer.

C. Closeout Documents:

1. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
    b. Sprinkler Wrenches: For each sprinkler type.
3. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.04 QUALITY ASSURANCE

A. Comply with FM (AG) requirements.

B. Designer Qualifications: Design of the system including all shop drawings, calculations, and other submittals shall be completed by a technician with a minimum NICET Level III certification or by a registered Professional

Engineer who has passed the NCEES professional engineering exam for fire protection and is licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience and approved by manufacturer.

E. Equipment and Components: Provide products that bear FM (AG) label or marking.

F. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:

1. Deringer
2. Tyco Fire Protection Products: www.tyco-fire.com.
3. Viking Corporation: www.vikinggroupinc.com.
4. Victaulic
5. Reliable Automatic Sprinkler Co.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for building areas noted.

B. Occupancy: Light hazard; comply with NFPA 13.

C. Water Supply: Determine volume and pressure from water flow test data.

2.03 SPRINKLERS

A. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.

1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Chrome plated.
4. Cover Plate Finish: White.
5. Fusible Link: Glass bulb type temperature rated for specific area hazard.

B. Hard Ceiling Type: Concealed pendant type.

1. Response Type: Quick.

2. Coverage Type: Standard.
3. Finish: Chrome plated.
4. Cover Plate Finish: White.
5. Fusible Link: Glass bulb type temperature rated for specific area hazard.

C. Flexible Drop System: Stainless steel, multiple use, open gate type.

1. Application: Use to properly locate sprinkler heads.
2. Include all supports and bracing.
3. Provide braided type tube as required for the application.
4. Manufacturers:
   a. Victaulic Company; Vic-Flex: www.victaulic.com/#sle.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Place pipe runs to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

SECTION 22 00 60 - PLUMBING & PIPING DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Contract documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.

B. This section specifies the demolition and removal of all plumbing equipment and distribution conduits including but not limited to air outlets, piping, insulation, plumbing fixtures and accessories in existing building.

C. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SUBMITTALS

A. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

B. Schedule of selective demolition activities:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of building utility services.
3. Coordination for shutoff, capping and continuation of services.
4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.

C. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.03 PROJECT CONDITIONS

A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48-hour notice to Owner of activities that will affect the Owner's operations.

B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.

C. Owner assumes no responsibility for condition of area to be selectively demolished.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and existing ductwork and piping arrangements are as shown on Drawings.

B. Verify that abandoned equipment serves only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.

D. The Contractor shall visit the existing building and grounds and review the existing building record drawings for details of existing installation to familiarize themselves with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the Contractor for any error or negligence on his part.

E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION

A. Disconnect mechanical systems in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by mechanical demolition work prior to commencing.

B. Disconnect utilities in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by plumbing demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and remove from site and extend existing mechanical work under provisions of this Division and as indicated on the Drawings unless otherwise noted.

B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.

C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-

suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.

D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.

E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.

F. Remove all accessories above grade. When removing equipment or terminal devices all associated pipe, etc. shall be removed and capped as required. Cut piping, tubing, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.

G. Fill all abandoned waste lines below floor slabs with low stress grout.

H. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.

I. Patch all openings created by removal of mechanical equipment, ATC devices, ducts, pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar materials and finish unless otherwise noted.

J. Seal all existing roof penetrations, which will not be reused. Roof patching shall be by project roofing contractor, or an Owner approved roofing contractor.

K. Remove, relocate, or provide brackets, hangers, and other accessories as required.

L. Repair adjacent construction and finishes damaged during demolition and extension work.

M. Maintain access to existing mechanical installations, which remain active.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.

B. All building surfaces damaged and openings left by new Work or the removal or relocation of mechanical equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

SECTION 22 01 00 - PLUMBING GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section applies to and forms a part of each of the sections of Division 22. This section, and each of the sections to which it applies, is subject to the requirements of the Instructions to Bidders, General Conditions, and Special Conditions of these complete specifications.

B. The work covered by this Division of the Specifications consists of furnishing all labor, supervision, equipment, materials, all incidentals, related items, and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.

C. Only such items as are hereinafter specified or indicated on the drawings to be furnished by others, shall be considered to be furnished by others. All other items are to be considered as a part of this Contract and shall be so bid.

D. The omission of specific reference to any parts necessary to, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from furnishing and installing same.

E. All work shall be finished, tested and ready for operation.

1.02 DEFINITIONS

A. Word "Furnish" where written in Division 22 specifications and drawings shall mean Contractor shall deliver to the site item(s) specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item or items specified.

B. Word "Install" where written in Division 22 specifications and drawings shall mean Contractor shall set in position, connect (including sub-assemblies furnished), and adjust for use. Contractor shall furnish miscellaneous specialty items such as hangers, valves, unions, piping, sheet metal, etc., as obviously necessary for a complete and operating installation.

C. Word "Material" where written in Division 22 specifications and drawings shall mean any and all apparatus, equipment, devices, fixtures, components, products, assemblies, items, parts, things, and any other pieces specified or shown or required.

D. Word "Labor" where written in Division 22 specifications and drawings shall mean any and all physical effort, manpower, time, expertise, tools, equipment, and services to carefully assemble, install and affix all material in a proper, complete, and acceptable manner.

E. Word "Provide" where written in Division 22 specifications and drawings shall mean "Mechanical Contractor shall furnish all labor and material and completely and properly install such material and leave same in acceptable condition and intended acceptable working order".

1.03 DISCREPANCIES OR OMISSIONS FROM DRAWINGS OR DOCUMENTS

A. Notify the Engineer of any discrepancies in, or omissions from the drawings or documents. Neither the Owner nor the Architect will be responsible for any oral instructions or modifications of the specifications or drawings. Written interpretations will be made only by Addenda.

B. If discrepancies are not reported, the contractor shall bid the greater quantity or better quality (highest dollar value), and appropriate adjustment will be made after contract award.

C. Discrepancies discovered during construction shall immediately be called to the attention of the Architect/Engineer for clarification.

D. All minor items necessary for the completion and successful operation of the system, whether or not herein definitely specified or indicated on the drawings, shall be furnished, and installed.

E. Omission of/or express reference to any material necessary for/or reasonably incidental to complete installation shall not release Contractor from providing such material. Where material is shown on drawings but is not specified or is specified but not shown, such material shall be considered both shown and specified.

F. Any work not clear to Contractor shall be referred to Engineer for clarification before bid is submitted. If no question is raised prior to opening of bid, Contractor shall be required to provide work in question as directed by Engineer, whose decision is final, without additional charges.

G. By virtue of submitting a bid, Contractor agrees that he is skilled and experienced in use of and in interpretation of drawings and specifications. Contractor further agrees that he has carefully reviewed all drawings, all specifications, and all addenda, which constitute bid documents for this contract, and finds them free of ambiguities and good and sufficient for bidding and construction purposes.

1.04 DRAWINGS

A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Furnish offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.

B. All piping and ductwork shall be routed so as not to obstruct access to other equipment (i.e. VAV box controls, electrical devices, fire alarm devices, etc.). Routing indicated on drawings is representative of intended location but shall be field verified. It shall be this contractor's responsibility to coordinate with other trades for accessibility.

C. Any work or system on the roof not explicitly indicated on the roof plan shall be approved by the engineer prior to installing.

D. In general, the mechanical equipment drawings are drawn to scale as noted. Obtain dimensions and locations of partitions, walls, etc., from the Architectural drawings wherever possible and do not scale the mechanical drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling

heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.

E. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.05 SITE INSPECTION

A. Before submitting a proposal for the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themself with all the existing conditions and limitations, including the extent of demolition, cutting, and patching to be done by the Contractor for Mechanical Work. No extras will be allowed because of the Contractor's misunderstanding as to the amount of work involved, or his lack of knowledge of any condition in connection with the work.

1.06 PRIOR APPROVAL REQUESTS

A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 10 days before receipt of bids.

B. The submission shall provide complete information, test, etc. relating to quality, performance, suitability, to determine acceptability of such products.

C. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known bidders.

D. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.

E. The cost of any changes of other trades as a result of use of the substitution material or equipment must be borne by the Contractor submitting such material or equipment.

1.07 REVIEW OF MECHANICAL MATERIALS AND EQUIPMENT

A. Within thirty (30) days after award of construction contracts, Contractor shall submit for acceptance to the Architect quantity of shop drawings specified for the equipment indicated in these specifications. The shop drawings shall include the equipment manufacturer’s name and address, catalog designation or model number, rough-in data & dimensions, performance curves and rated capacities & operational characteristics.

B. The Contractor shall thoroughly review each item for compliance with these Specifications making any necessary corrections prior to submittal. Each shop drawing set shall be stamped, signed, and dated indicating Contractor review and submitted electronically via PDF file format. The PDF file name shall include the relevant specification section number for reference. If the Contractor fails to properly review shop drawings, the Contractor shall reimburse the Engineer for all additional reviews on a time and material basis.

C. Provide samples of materials or equipment proposed to be furnished, if requested. Samples shall become the property of the Architect/Engineer and will be returned only when accompanied by a written request to do so.

D. None of the items listed shall be purchased, delivered to the site, or installed, until the item is reviewed. No substitution will be permitted after review except where such substitution is considered by the Architect to be in the best interest of the Owner.

E. The Engineer will review all Shop Drawings submitted and will retain a copy for record file.

F. Approval Stamp: This review is to verify general conformance with the design concept of the Project and substantial compliance with the information provided in the Contract Documents. This review does not in any way relieve the Contractor or their suppliers of their responsibility to provide all materials and equipment as specified, in quantities, quality and dimensions required. Submittals will be reviewed with the following actions:

1. "No Exception Noted" indicates that the Submittal appears to conform to the design concept of the Work and that the Contractor, at his discretion, may with fabrication and/or procurement and installation.
2. "Make Corrections Noted" indicates that the Submittal, after noted corrections are made, appears to conform to the design concept of the Work and that the Contractor, at his discretion, may proceed with fabrication and/or procurement and installation, if the corrections are accepted by the Contractor without any increase in Contract Sum or Time.
3. "Revised and Resubmit" indicates that the noted revisions are such that a corrected copy of the Submittal is required for review to confirm that the noted revisions have been understood and made. The Contractor, at his discretion, may proceed with fabrication and/or procurement and installation after submitting a corrected copy and verifying with the reviewer that the corrected copy is acceptable, if the corrections are accepted by the Contractor without an increase in the Contract Sum or Time.
4. "Rejected" indicates that the Submittal does not appear to conform to the specifications, a resubmission is required, and fabrication or procurement is not authorized.

G. If the Engineer rejects (Revised and Resubmit or Rejected) the same section two times the engineer shall be compensated for additional reviews. Any subsequent submittal will require the inclusion of a check made out to the engineer in the amount of $ 500.00. Contractor is responsible for all delays caused by the resubmittal process.

H. Should the contractor fail to comply with any of the requirements of the preceding sub-paragraphs; then the right is reserved by the Architect to select any or all items in the material schedule, with that selection to be final and binding upon the contractor. The materials selected or reviewed, as the case may be, by the Architect, shall be used in the work at no additional cost to the Owner.

I. When the contractor chooses to furnish and reviewed material or equipment that requires electrical specifications/connections (circuit breaker, conduit, wire, labor, etc.) different than shown and/or scheduled on the drawings, or specified in detail, the contractor shall be responsible for coordinating any necessary changes and shall bear the cost of such changes (including engineering costs).

J. Connections and equipment clearances are based on the manufacturer scheduled. Any deviations in size, weight, and/or configuration shall be the responsibility of the contractor. Equipment by other approved manufacturers will be acceptable if of a similar type and grade and if of approximately the same general overall dimensions. Quality, construction and performance must be equal to or better than that specified.

K. When the contractor chooses to furnish any reviewed material or equipment that requires electrical specifications/connections (circuit breaker, conduit, wire, labor, etc.) different than shown and/or scheduled on the drawings, or specified in detail, the contractor shall be responsible for coordinating any necessary changes and shall bear the cost of such changes (including engineering costs).

1. Submit detailed documentation of all required changes, confirmation of coordination with the Electrical Contractor, and an estimated cost breakdown prior to ordering.

L. All contractor requested changes from the design, including size, weight, configuration, and electrical modifications, must be submitted for review and proof of coordination prior to approval.

1.08 PROPOSAL REQUESTS AND INSTRUCTIONS

A. For any proposal request or instruction that requires an adjustment to the Contract Sum, submit an itemized quotation for the change(s) described in the proposed modifications to the Contract Documents. Proposal shall also indicate credits, deducts, and/or offsets for material and labor originally included in contract.

1. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. Breakdown shall include amounts, lengths, quantities, types, sizes, etc. of material.
2. Indicate applicable taxes, O&P, delivery charges, equipment rental, and other incidental charge.
3. Include costs of labor and supervision directly attributable to the change.
4. All sub-contractor pricing shall include the same breakdown as described above.

1.09 WARRANTY

A. All equipment and installation shall be provided with a 1-year warranty beginning with substantial completion.

B. Refer to individual spec sections for specific warranty information that is different than stated above.

C. Submit warranty with related forms completed in Owner's name and registered with manufacturer.

1.10 MANUALS

A. In addition to catalog data and shop drawings submitted for review, this contractor shall furnish two (2) final Operation and Maintenance Manuals for the mechanical systems. Manuals shall be delivered to the Architect before final observation of the work.

B. Operation and Maintenance Manuals shall be furnished in PDF electronic format .

C. Provide an index at the beginning of the manual for the sections included in the manual.

D. Include at the front of the manual a complete listing of the Architect, Engineer and contractors and sub-contractors used on the project. Listing shall include names, addresses and phone numbers for each.

E. Manuals shall be arranged in order similar to the specifications. All major pieces of equipment shall be referenced with tabs. At the beginning of each section, the equipment supplier's name, address, and phone number shall be provided.

F. Data for equipment included in the manuals shall include:

1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used.
2. Operations Manuals detailing step by step procedure to follow putting the equipment into operation.
3. Maintenance Manuals from the manufacturer of each piece of equipment including instructions on installation, maintenance, and lubrication. Manuals shall include parts lists for all replacement parts.

G. The following items shall also be included in the manuals for the Owners information: Valve Tag list and Signed owner instruction forms for all items specified as requiring owners instruction

H. Operations and Maintenance Manuals shall be submitted to the Engineer for approval prior to delivery to the Architect.

1.11 INSTALLATION OF EQUIPMENT

A. All equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications. Auxiliary piping, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.

1.12 RECORD DRAWING

A. The contractor shall maintain one set of drawings at the job site used as a master copy. Each change order or other revision, deletion, or addition shall be clearly marked and noted by colored pencil. This copy of plans shall be furnished to the Architect upon completion of the project.

B. The contractor shall note on the record drawings the elevations and/or inverts of water service where it exits the building foundation.

1.13 COOPERATION WITH OTHER TRADES

A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.14 INSPECTION OF SITE

A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themself with all of the existing conditions and limitations. No extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.15 PAVEMENT, CURB AND SIDEWALK REPLACEMENT

A. This Contractor shall be responsible for replacement of existing street pavement, curbs, and sidewalks, etc., removed or damaged by them during the course of the work, unless such pavement, curbs, sidewalks are to be constructed under the General Contract. The work shall be done in accordance with local requirements.

1.16 CODES, ORDINANCES, REGULATIONS & STANDARDS

A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.

B. All work shall conform to applicable state and local codes, ordinances, regulations and/or standards.

1.17 PERMITS AND LICENSES

A. This contractor shall obtain and pay for all licenses and permits and shall pay for all fees and charges for the connection to outside services and use of property other than the site of the work for storage of materials or other purposes.

B. Contractor shall coordinate and request all inspections from authority having jurisdiction. The Contractor shall notify the Architect of all such coordinated inspections (date & time) and shall submit certificates of inspection and final approval of the local inspection authority.

1.18 TESTS

A. Test all equipment installed under these specifications and demonstrate its proper operation to the Engineer.

B. Do not test or operate equipment for any purpose, until it has been fully lubricated in accordance with the manufacturer's instructions and, if it is a centrifugal pump, until it has been connected to the piping system with sufficient water so that it will not run dry.

C. All testing shall be completed before final inspection, and test results shall be available during the final inspection.

1.19 GUARANTEES

A. This contractor shall guarantee all equipment, material, and workmanship for a period of one year from date of final certificate. Any defects in mechanical equipment, workmanship or materials that appear, or cause trouble of any kind within a period of one year from date of final certificate shall be remedied, free of charge. Refer to other sections of these specifications for guarantees in excess of the requirements herein described.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 22 01 50 - PLUMBING & PIPING MATERIALS & METHODS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section covers basic materials and methods and applies to and forms a part of each of the sections of Division 22.

B. This work shall be in accordance with this and other applicable sections and/or provisions of these specifications and with the applicable drawings.

1.02 MATERIALS & MANUFACTURERS

A. All materials and equipment shall be new, free of defects, installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practice of the industry.

B. Certain materials and/or equipment in this specification are specified by manufacturer and catalog numbers. The design was based on the specified equipment and establishes a degree of quality, performance, physical configuration, etc. If the contractor should elect to use equipment other than the equipment used as a basis for design but listed as "acceptable" in the specifications, he shall be responsible for space requirements, configuration, performance, and changes in bases, supports, vibration isolators, structural members, openings in structure and other apparatus that may be affected by its use.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 COORDINATION OF OPENINGS

A. This contractor shall coordinate all openings required for new piping, equipment, controls, etc. through any structural slabs, beams, or walls. Contractor shall request a copy of the precast concrete shop drawings and verify locations and sizes of all openings required.

B. All costs associated with structural field changes or redesigns of the building systems due to lack of field coordination shall be responsibility of this contractor.

3.02 PIPE AND FITTING INSTALLATION

A. Plastic DWV piping shall be installed as addressed by IAPMO (UPC) code section on Expansion and Contraction. Any straight runs of plastic DWV piping exceeding 30 feet shall be installed to accommodate thermal expansion.

B. Piping is to be installed as shown on the drawings as much as practical. When a pipe size is not indicated, the subcontractor shall request the pipe size from the Architect through the Plumbing Contractor.

C. Provide sufficient swing joints, expansion loops, and/or devices necessary and install so as to permit free expansion and contraction of piping without causing undue stresses. Make all changes in direction with fittings. Support piping independently at all equipment so that its weight shall not be supported by the equipment.

D. Install piping without springing or forcing and clear all windows, doors, and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted.

E. All pipes shall be reamed to full pipe diameter before joining.

F. Install vertical risers plumb and straight, horizontal lines parallel with walls and partitions. Conceal piping above ceilings and within furring and/or walls when practical.

G. Provide shut-off valves and unions suitably located to isolate each item of equipment, branch circuit or section of piping.

H. Provide 1/2" drain valves at all low points of each system to enable complete drainage.

I. Provide "Clearflow" dielectric waterways at all junctions of dissimilar metals in potable water systems.

J. All piping shall be adequately supported from the building structure with adjustable hangers to maintain uniform grading where required and to prevent sagging or pocketing.

K. Provide supports between piping and building structure where necessary to prevent swaying.

L. The use of wire or perforated metal to support pipe will not be permitted.

3.03 PROTECTION, DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for the delivery and storage of materials and make the required arrangements with other contractors for the introduction into the building of equipment too large to pass through finished openings.

B. Protect materials and equipment stored on site from weather and moisture by maintaining factory covers and/or suitable weather-proof coverings. For extended outdoor storage, motors shall be removed from equipment and stored separately.

C. The open ends of all piping shall be covered whenever that system is not being worked on, i.e. end of the workday, completion of a section, etc. Covering shall keep dust, garbage, vermin, and other foreign objects out of the piping when the contractor is not on the jobsite.

3.04 CUTTING AND REPAIRING

A. All holes and penetrations required for the installation of the plumbing equipment shall be by the plumbing contractor. This shall include all piping, ductwork, and any other penetration through the wall, floor, or roof.

B. Cutting construction shall be done only with the written permission of the Architect. Cutting shall be done carefully and damage to buildings, pipes, wiring, or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved at no additional charge to the Owner. This Contractor shall be responsible for all cutting and patching unless such work has been delegated to the General Contractor.

C. All holes cut into concrete shall be cut by means of power saws or core drills. All unsightly spalls or chips shall be repaired.

D. All openings remaining around duct and pipe penetrations shall be filled, caulked, and painted to match wall. Code approved fire caulking shall be used for all rated penetrations.

3.05 SEALING FLOOR, CEILINGS AND WALL OPENINGS

A. Where pipes pass through walls, ceilings, floors, or partitions, (other than those through fire rated walls or chases) the opening in the construction around the pipe shall not exceed ½ inch average clearance on all sides and shall be sealed to prevent the passage of sound and air. Coordinate wall openings to allow insulation thickness to pass through walls if allowed.

B. The material used to seal space between the wall and the pipe shall be non-combustible caulk type, or wrap type, as conditions require. Provide sheet metal angles or flanges as may be required to contain the stopping material. Use of expanding foam will be allowed if surfaces are cleaned of an excess material and all edges are trimmed smooth. Penetrations through exterior walls shall be sealed weather tight.

C. Acceptable manufacturers shall be Hilti, 3M Brand, or a prior approved product.

3.06 CLEANING AND PAINTING

A. Clear away all debris, surplus materials, etc., resulting from work or operations, leaving the job and equipment furnished under this contract in a clean condition.

B. All equipment being furnished with finished paint coat shall be examined upon job completion for scratches and other surface damage. All finished surfaces where necessary shall be touched up with touch-up paint of color to match the factory finish.

3.07 ASBESTOS FREE BUILDING

A. There shall be no products or building materials used as a temporary or permanent element in the construction of this building, which has in its make-up any form of asbestos. The contractors shall be responsible to monitor shop drawings and product literature to verify the make-up of materials to be used in the building and remind material suppliers that their products must be asbestos free.

B. Notify the Architect immediately of any existing materials which are suspected of containing asbestos. Do not disturb or attempt to remove any asbestos containing material. The Architect will contact the Owner and inform them of the Contractors observations. The Owner will obtain and provide the services of professionals skilled in asbestos removal.

3.08 SALVAGE

A. All items removed from existing building shall be salvaged in a workmanlike manner.

B. The handling, storage, and disposition of salvage materials shall be as directed by the Architect. Generally, all salvage material shall remain the property of the Owner. Materials and equipment not wanted by Owner shall be removed from the job site and become the property of the contractor.

END OF SECTION

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ball valves.

1.02 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard; 2025.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

E. ASME B31.9 - Building Services Piping; 2020.

F. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

G. AWWA C606 - Grooved and Shouldered Joints; 2015.

H. NSF 61 - Drinking Water System Components - Health Effects; 2017.

I. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Closeout Documents:

1. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.04 QUALITY ASSURANCE

A. Manufacturer:

1. Obtain valves for each valve type from single manufacturer.
2. Company must specialize in manufacturing products specified in this section, with not less than five years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Use the following precautions during storage:

1. Maintain valve end protection and protect flanges and specialties from dirt.
2. Store valves in shipping containers and maintain in place until installation.

a. Store valves indoors in dry environment.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C. Provide the following valves for the applications if not indicated on drawings:

1. Shutoff: Ball.
2. Throttling: Ball.

D. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.

E. Domestic, Hot and Cold Water Valves, low-lead compliant:

1. 2 inch and Smaller:
   a. Bronze: Provide with solder-joint, threaded, or press-fit ends.
   b. Ball: Two piece, full port, bronze with stainless-steel trim.
   c. Bronze Swing Check: Class 125, bronze disc.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:

1. Hand Lever: Quarter-turn valves 6 NPS and smaller.

D. Insulated Piping Valves: With 2 inch stem extensions and the following features:

1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

E. Valve-End Connections:

1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

F. General ASME Compliance:

1. Solder-joint Connections: ASME B16.18.
2. Building Services Piping Valves: ASME B31.9.

G. Potable Water Use:

1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

H. Source Limitations: Obtain each valve type from a single manufacturer.

I. Press-Fit Valve Manufacturers:

1. Watts
2. Viega
3. Milwaukee
4. Apollo
5. NIBCO

J. Valve manufacturers unless otherwise noted:

1. Apollo
2. Jomar
3. NIBCO
4. Hammond
5. Milwaukee
6. Watts

2.03 BRONZE, BALL VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Stainless Steel trim.

1. WSP Rating: 150 psi.
2. WOG Rating: 600 psi.
3. Body: Forged bronze or dezincified-brass alloy.
4. Ends Connections: Pipe thread or solder.
5. Seats: PTFE.
6. Stem: Stainless steel, blowout proof.
7. Ball: Stainless steel.
8. Operator: Provide lockable handle and stem extension.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Install check valves where necessary to maintain direction of flow as follows:

1. Swing Check: Install horizontal maintaining hinge pin level.

D. Install check valves at least 5 pipe diameters from pumps or changes in direction.

E. Provide chainwheels on operators for valves 4 inch NPS and larger where located 96 inches or more above finished floor, terminating 60 inches above finished floor.

END OF SECTION

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tags.

B. Pipe markers.

C. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide manufacturers catalog literature for each product required.

C. Closeout Documents:

1. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
    a. Submit plumbing component identification schedule listing equipment, piping, and valves.
    b. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
    c. Valve Data Format: Include id-number, location, function, and model number.
2. Project Record Documents: Record actual locations of tagged valves.

D. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Tags:

1. Piping: 3/4 inch diameter and smaller.
2. Manual operated and automated control valves.
3. Instrumentation, relays, gauges, and other related control equipment products.

B. Pipe Markers: 3/4 inch diameter and higher.

2.02 TAGS

A. Manufacturers:

1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
2. Brady Corporation: www.bradycorp.com/#sle.
3. Brimar Industries, Inc.: www.pipemarker.com/#sle.

4. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
6. Seton Identification Products: www.seton.com.

B. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch in diameter.

C. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.

D. Valve Tag Chart: Typewritten 12-point letter size list in anodized aluminum frame.

E. Piping: 3/4 inch diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

2.03 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation: www.bradycorp.com.
2. Brimar Industries, Inc: www.pipemarker.com/#sle.
3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
5. Seton Identification Products: www.seton.com.

B. Comply with ASME A13.1.

C. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.

D. Identification Scheme, ASME A13.1:

1. Primary: External Pipe Diameter, Uninsulated or Insulated.
    a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
    b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
2. Secondary: Color scheme per fluid service.
    a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
3. Tertiary: Other Details.
    a. Directional flow arrow band over pipe circumference.

2.04 CEILING TACKS

A. Manufacturers:

1. Craftmark: www.craftmarkid.com.
2. Seton Identification Products: www.seton.com.
3. 3M

B. Description: Stee with 3/4 inch diameter color coded head.

C. Color code as follows:

1. Plumbing Equipment: Yellow.
2. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

A. All new piping shall be identified as to contents and direction of flow by stenciling or markers, as specified. Apply where pipes pass through walls (both sides of the wall), at each change of direction and on each 20 feet of straight lengths. For insulated pipe, stencil/marker size shall be based on insulation size, not pipe size.

1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.

B. Piping shall be identified as to contents using the following list. Additional system details shall be included within this specification section.

Cold Water	C.W.
120° F Hot Water	H.W.
Sanitary Drain	SAN. DRAIN
Sanitary Vent	SAN. VENT

C. Valves controlling mains, risers and branches, but not individual shut-off or local control valves on fixtures and equipment, shall be identified by a metal tag Schedules, framed under glass and mounted where directed, shall be provided showing a complete listing of all valve tags and giving numbers, locations, and color codes, if any, of pipes controlled. Frames shall be secured to wall by not less than four screws.Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

D. Install tags in clear view and align with axis of piping.

E. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.

F. Apply ASME A13.1 Pipe Marking Rules:

1. Place pipe marker adjacent to changes in direction.
2. Place pipe marker adjacent each valve port and flange end.
3. Place pipe marker at both sides of floor and wall penetrations.
4. Place pipe marker every 20 feet interval of straight run.

G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass fiber insulation.

1.02 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2025.

C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER INSULATION

A. Manufacturers:

1. CertainTeed Corporation: www.certainteed.com.
2. Johns Manville Corporation: www.jm.com.
3. Knauf Insulation: www.knaufusa.com.
4. Owens Corning Corporation: www.ocbuildingspec.com/sle.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Hot Lines with Glass Fiber Insulation:

1. Pipe - Butt all side and end joints tightly and apply a brush coat of fire retardant lagging adhesive to all laps and joint strips. Seal laps, pulling jacketing tight and smooth. Self sealing laps shall be secured according to manufacturers published recommendations. Open ends of pipe insulation shall be neatly stopped off and tapered down with insulating cement and covered with canvas embedded into a wet coat of fire retardant lagging adhesive.
2. Fittings - All fittings shall be insulated with segments of glass fiber pipe insulation or loops of insulating blocks firmly held in place with #16 galvanized soft wire. Cover all fitting insulation with Zeston, or equal, white plastic fitting covers.
3. Valves Etc. - All valve bodies, strainers and flanges shall be insulated as specified for fittings.

C. Cold Lines with Glass Fiber Insulation:

1. Pipe - Butt all side and end joints tightly and apply a brush coat of fire retardant lagging adhesive to all laps and joint strips. Seal laps, pulling jacketing tight and smooth. Ends of pipe insulation shall be sealed with a fire retardant vapor barrier coating at all fittings and valves, and at intervals of 21 feet on continuous runs of pipe. Self sealing laps shall be secured according to manufacturers published recommendations.

2. Insulation, vapor barrier and covering shall be continuous through all domestic cold water pipe supports and pipe sleeves.
3. Fittings - All fittings shall be insulated with molded fiber glass fittings, segments of pipe covering, or with compressed flexible glass fiber secured in place with non-corrosive wire. All thicknesses to be equal to that of adjoining pipe covering. Cover all fitting insulation with Zeston, or equal, white plastic fitting covers. If batt type insulation is used, it must be a minimum of 1 pound density and 1 inch thick.
4. Valves Etc. - All valve bodies, strainers and flanges shall be insulated as specified for fittings.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

E. Install insulation with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.

1. Inserts and Shields:
   a. All domestic piping 1-1/2 inch and smaller, no insert is required below the insulation. Saddles shall be provided for all insulated piping. Both inserts and saddles shall be provided for all piping 2 inch and larger.
   b. On domestic water, a pipe insulation protection saddle of 22 gauge galvanized sheet metal for piping 3 inch diameter and smaller, and 18 gauge for piping larger than 3 inch diameter, shall be provided at supports where pipe is supported by the insulation or inserts. The saddle shall be at minimum length of 12 inch.
   c. Pipe supports for piping which operates below 250°F shall made be high density phenolic foam pipe insulation similar to Tru-Balance 2550FS saddles as manufactured by Buckaroos, Inc. Insulation in saddles shall meet ASTM E-84 ratings for 25/50 flame/smoke spread.
2. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

3.03 SCHEDULES

A. Plumbing system glass fiber insulation sizes:

Service	**Pipe Size**	**Insulation Thickness**
Cold water	1-1/4 inch and less	1/2 inch
Cold water	1-1/2 inchand greater	1 inch
Hot water (105F to 140F)	1 inch and less	1 inch
Hot water (105F to 140F)	1-1/4 inchto 1-1/2 inch	1-1/2 inch

B. For piping smaller than 1-1/2 inch and located in partitions within conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted, but not to a thickness less than 1".

END OF SECTION

SECTION 22 10 05 - PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary waste piping, above grade.

B. Domestic water piping, above grade.

C. Pipe flanges, unions, and couplings.

D. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2025).

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.

D. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.

E. ASME B31.9 - Building Services Piping; 2020.

F. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

G. ASSE 1003 - Water Pressure Reducing Valves for Potable Water Distribution Systems; 2023.

H. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

I. ASTM B32 - Standard Specification for Solder Metal; 2020.

J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

L. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.

M. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.

N. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2026.

O. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

P. ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

Q. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).

R. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2025.

S. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020 (Reapproved 2024).

T. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

U. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2024.

V. AWWA C606 - Grooved and Shouldered Joints; 2015.

W. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

X. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

Y. FM 1680 - Examination Standard for Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/ Commercial and Residential; 2025.

Z. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.

AA. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.

BB. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

CC. NSF 61 - Drinking Water System Components - Health Effects; 2017.

DD. NSF 372 - Drinking Water System Components - Lead Content; 2016.

EE. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
2. Welder Certificate: Include welders certification of compliance with ASME BPVC-IX.

C. Closeout Documents:

1. Project Record Documents

1.04 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY WASTE PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, ASTM A888 hubless,.

1. Fittings: Cast iron.
2. Joints: ASTM C1540 neoprene gaskets heavy-duty stainless steel clamp-and-shield assemblies. For vent piping, provide neoprene gaskets with standard duty stainless steel clamp-and-shield assemblies.

B. PVC Pipe: ASTM D2665.

1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88, (ASTM B88M), 1 1/2 inch and smaller shall be Type L hard drawn copper. Tubing 2 inch and larger shall be Type M hard drawn copper. Soft drawn copper tubing in small sizes may be used adjacent to fixtures and equipment.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, alloy Sn95 solder.
3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
    a. Manufacturers:
        1) Apollo Valves: www.apollovalves.com/#sle.
        2) Viega LLC: www.viega.com.

3) Nibco

4) Milwaukee

2.04 PIPE FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 inch and Under:

1. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Sizes Over 1 inch:

1. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
3. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
6. Manufacturers:
   a. Victaulic - Style 606.

D. No-Hub Couplings (Sanitary Vent Piping Only):

1. Testing: In accordance with ASTM C1277 and CISPI 310.
2. Gasket Material: Neoprene complying with ASTM C564.
3. Clamp: Type 304 Stainless Steel.
4. Band Material: Type 304 Corrugated Stainless steel (0.010-inch thick).
5. Screw Material: Type 305 or 304L Stainless steel (5/16").
6. Manufacturers:
   a. Husky SD-2000.

E. Shielded, Heavy Duty No-Hub Couplings:

1. Testing: In accordance with ASTM C1540 and FM 1680.
2. Gasket Material: Neoprene complying with ASTM C564.
3. Clamp: Type 304 Stainless Steel.
4. Band Material: Type 304 Corrugated Stainless steel (0.015-inch thick).
5. Screw Material: Type 305 or 304L Stainless steel (3/8").
6. Manufacturers:
   a. Husky SD-4000.

F. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

1. Manufacturers:
   a. Anvil
   b. Erico-Caddy
2. Hangers for all piping shall be oversized to encircle the piping and the insulation, the insulation shall be continuous through all hangers.
   a. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.

B. Plumbing Piping - Drain, Waste, and Vent:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
3. Hanger Rods: Zinc-plated steel, threaded both ends, threaded one end, or continuous threaded.
4. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
3. Hanger Rods: Zinc-plated steel, threaded both ends, threaded one end, or continuous threaded.
4. Wall Support for Pipe Sizes Up to 3 inch: Cast iron hook.
5. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
6. Floor Support for Hot Pipe Sizes to 4 inch: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
7. Copper Pipe Support: Carbon steel ring, adjustable, copper plated for uninsulated copper pipe.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Comply with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Comply with ICC-ES AC01.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. The contractor shall note plastic pipe is not allowed above the ceilings in any areas that are used as return air plenums.

C. Plastic DWV piping shall be installed as addressed by IAPMO (UPC) section on Expansion and Contraction. Any straight runs of plastic DWV piping exceeding 30 feet shall be installed to accommodate thermal expansion.

D. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

F. Install piping to maintain headroom, conserve space, and not interfere with use of space.

G. Group piping whenever practical at common elevations.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 05 16.

I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

   1. See Section 22 07 19.

J. Provide access where valves and fittings are not exposed.

   1. Coordinate size and location of access doors with Section 08 31 00.

K. Install valves with stems upright or horizontal, not inverted. See Section 22 05 23.

L. Install water piping to ASME B31.9.

M. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

N. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

O. Sleeve pipes passing through partitions, walls, and floors.

P. Inserts:

   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

Q. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.
2. Support horizontal piping as per local plumbing codes.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Hangers shall not be placed on couplings.
6. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
8. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
9. Provide copper plated hangers and supports for copper piping.
10. Provide stainless steel hangers and rods for piping installed in corrosive environments (ie. swimming pools, green houses, etc.).
11. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
    a. Painting of interior plumbing systems and components is specified in Section 09 91 23.
    b. Painting of exterior plumbing systems and components is specified in Section 09 91 13.
12. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 22 05 48.
13. Support cast iron drainage piping at every joint within 18 inches.
14. All hangers shall be oversized to encircle the piping and the insulation. Insulation shall be continuous through all hangers.

R. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

END OF SECTION

SECTION 22 10 06 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ice maker outlet boxes.

1.02 REFERENCE STANDARDS

A. NSF 61 - Drinking Water System Components - Health Effects; 2017.

B. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
2. SIndicate dimensions, weights, and placement of openings and holes.
3. Certificates: Certify that grease interceptors meet or exceed specified requirements.

C. Closeout Documents:

1. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

D. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, and water hammer arrestors.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

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

2.02 REFRIGERATOR AND ICE MACHINE TRIM BOXES AND VALVES (IMT-1)

A. Box Manufacturers:

1. IPS Corporation/Guy Gray FRIB12ABSHA High Temperature Resin : www.ipscorp.com
2. Oatey Supply Chain Services, Inc: www.oatey.com/#sle.

B. Valve Manufacturers:

1. IPS Corporation[<>]: www.ipscorp.com.
2. Oatey Supply Chain Services, Inc: www.oatey.com/#sle.

C. Description: High Temperature Resin preformed rough-in box with quarter turn brass valve, slip in finishing cover. Integral water hammer arrestor .

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sinks.

1.02 REFERENCE STANDARDS

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

B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).

C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

D. ASME A112.18.1 - Plumbing Supply Fittings; 2024.

E. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.

F. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.

G. ASSE 1014 - Performance Requirements for Backflow Prevention Devices for Hand-Held Showers; 2020.

H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.

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

J. NSF 61 - Drinking Water System Components - Health Effects; 2017.

K. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Closeout Documents:

1. Manufacturer's Instructions: Indicate installation methods and procedures.
2. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
3. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 REGULATORY REQUIREMENTS

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.07 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. This Contractor shall submit a portfolio showing fixtures and trimmings to the Architect for his approval.

2.02 FIXTURE SUPPORT AND FASTENINGS

A. All fixtures shall be securely anchored independent of finished wall.

B. Fastening to masonry walls shall be by brass bolts or machine screws in lead sleeve type anchorage units, or 1/4 inch brass expansion bolts of sufficient length to extend at least 3 inches into solid masonry.

C. Fastening to wood partitions shall be by the use of round head brass wood screws. Wood screws shall go into solid wood, such as wood inserts, floor joists, studs, or 2" x 6" set between studs.

D. Fixture fastening with steel stud partitions shall be done by bolting or welding a 3/8" x 6" wide steel plate to studs and extending the plate one stud beyond the first and last fixture mounting points or provide an equivalent rigid mounting frame in wall. Fixture carriers shall be provided where noted.

E. All water supply pipe stubs through walls to shower heads and to flush valves shall be securely anchored within the wall or plumbing space.

2.03 ACCESSORIES

A. Carriers:

1. See Fixtures

B. Stops

1. Manufacturers:

a. Brass Craft

b. McGuire

2. Faucet, stop valves, traps, etc., shall be heavy cast brass. Water lines to all individual fixtures shall be equipped with high grade chromium plated brass compression stop valves. Each individual fixture shall be provided with valves on the supply line.
    a. Stop valves: Brass Craft KTCR19X C, 1/4 turn ball valve, chrome plated, with Tee handle.
    b. Stop valves with dual outlets for coffee makers, dishwashers, etc., shall be Brass Craft CR1901LR1, Multi turn compression valves, or prior approved equal.

C. Undercounter Dishwashers shall be connected via approved air gap fitting.

2.04 MANUFACTURERS

A. Sink Trim:
    1. T & S Brass, Chicago Faucet, Zurn Commercial, or approved equal.

B. Sinks:
    1. Elkay, Just, or approved equal.

2.05 FIXTURES

A. NSF International certified sinks shall be used in all food prep areas.

B. S-1, Sink:
    1. Sink: Elkay LRAD1919, Countertop, single compartment, type 304, 18-8 stainless steel, 18 gauge, self-rimming, back ledge.
    2. Trim: Chicago 201-AGN2AE3-317AB with 5" gooseneck spout, wristblade handles, aerator, LK-35 stainless steel basket strainer.
    3. Trap: Chrome plated cast brass "P" trap.
    4. Supplies: 3/8" angle supplies with flexible tube riser, brass stops, chromed finish.
    5. Size: 19 1/2" x 19" x 5 1/2"
    6. Trap Guard: Truebro Lav Guard Model 102 E-Z, P-trap and wall supplies insulation kit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with handle stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall carriers and bolts.

E. Where fixtures come in contact with floor or wall, joint shall be sealed with silicone caulking of color to match fixture.

F. Provide stainless steel wall escutcheon on waste pipe through the wall for lavatories and sinks.

G. For all flush valves installed in ADA installations, coordinate space for service of flush valve with grab bars.

H. For connection to residential dishwasher, provide stainless steel braided hose from stop valve to dishwasher connection.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

B. Adjust wristblade handles on all sinks and lavatories to be rotated 22.5-degree forward.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

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

B. Do not permit use of fixtures by construction personnel.

C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 22 60 00 - GAS AND VACUUM SYSTEMS FOR HEALTHCARE FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, tube, and fittings.

B. Outlets.

1.02 ABBREVIATIONS AND ACRONYMS

A. CGA: Compressed Gas Association.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.

B. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

C. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

D. CGA V-5 - Standard for Diameter Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications); 2019.

E. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.

F. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

G. NFPA 99 - Health Care Facilities Code; 2015.

H. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate general assembly of components, mounting and installation details, and general layout of control and alarm panels. Submit detailed medical wall assembly drawings.

C. Closeout Documents:

1. Manufacturer's Instructions: Provide for products listed below. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
2. Operation Data: Include installation instructions, assembly views, lubrication instructions, and assembly views.
3. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone.
4. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Medical Gas Systems: Select products and execute work in compliance with NFPA 99.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience. All installers shall be in compliance with current edition of NFPA 99.

D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept material on-site in factory containers and packing. Inspect for damage.

B. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Allied Healthcare Products, Inc: www.alliedhpi.com.

B. Amico Corporation: www.amico.com.

C. BeaconMedaes: www.beaconmedaes.com.

2.02 PIPE AND FITTINGS

A. Oxygen Aboveground:

1. Copper Tube: ASTM B88 (ASTM B88M), Type L (A), drawn.

B. Vacuum Systems, Aboveground:

1. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn.

2.03 OUTLETS

A. Outlet Units:

1. Manufacturers:
   a. Amico Corporation: www.amico.com.
2. Chemtron non-interchangeable connectors, automatic valves, secondary check valves (except vacuum and evacuation outlets), and capped 3/8 inch tubing stubs for supply connections, color coded and labeled for intended service.

B. Faceplates:

1. Flush Outlets: Mount in galvanized steel boxes with stainless steel faceplate with polycarbonate cover, color coded with embossed labeling.
2. Surface Outlets: Surface mount with color coded plastic cover and stainless steel faceplate with polycarbonate cover, color coded with embossed labeling.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with NFPA 99 applying system specific piping service font and tag colors.

B. Pre-Installation Cleaning: Disassemble positive pressure gas systems pipe, fittings, valves, and components, except those supplied cleaned and prepared for intended service, and thoroughly wash in hot solution of sodium carbonate or trisodium phosphate mixed 1 lb to 3 gal of water. After washing, rinse with water, dry and cap until installation.

C. Braze joints in pipe and tubing. Avoid leaving excess flux inside of pipe and fittings. During brazing of pipe connections, purge interior of pipe continuously with nitrogen.

D. Effect changes in size with reducing fittings. Make changes in direction of required turns or offsets with fittings or tubing shaped by bending tools. Make bends free of flattening, buckling or thinning of tube wall.

E. Cut pipe and tubing accurately and install without springing or forcing.

F. Provide pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Finish flush at both ends. Extend 2 inches above finished floors. Pack space between pipe or tubing and sleeve, and calk.

G. Identify piping with tape and decals. Provide piping identification code and schematic for installation under provisions of Section 22 05 53. Install labeling on pipe at intervals of not more than 20 feet and at least once in each room and each story traversed by pipeline.

H. Pipe Support; Space pipe hangers horizontally by pipe size or vertically as follows:

1. 1/2 inch 6 feet.
2. 3/4 inch 7 feet.

I. Except where indicated or in flush wall mounted cabinets, install manual shut off valves with stem vertical and accessible for operation and maintenance.

3.02 PIPING SYSTEMS CLEANING AND PRESSURE TESTING

A. After erection of pipe and tubing but prior to installation of service outlet valves, blow systems clear of free moisture and foreign matter with nitrogen gas.

B. Install service outlet valves, subject system to test pressure of 150 psi with nitrogen or dry compressed air. Check with soapy water. Provide 24-hour standing pressure test.

3.03 FIELD QUALITY CONTROL

A. Independent testing agency to certify system is complete, zone valves installed, alarm systems functional, and tests performed. Document tests and submit. All testing to completed in compliance with current edition of NFPA 99.

END OF SECTION

SECTION 23 00 60 - MECHANICAL DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Contract documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.

B. This section specifies the demolition and removal of all HVAC equipment and distribution conduits including but not limited to ductwork, piping, controls, insulation, and accessories in existing building.

C. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SUBMITTALS

A. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

B. Schedule of selective demolition activities:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of building utility services.
3. Coordination for shutoff, capping and continuation of services.
4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.

C. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.03 PROJECT CONDITIONS

A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48-hour notice to Owner of activities that will affect the Owner's operations.

B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.

C. Owner assumes no responsibility for condition of area to be selectively demolished.

D. Hazardous Materials:

1. It is not expected that hazardous materials will be encountered in the Work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and existing ductwork and piping arrangements are as shown on Drawings.

B. Verify that abandoned equipment serves only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.

D. The Contractor shall visit the existing building and grounds and review the existing building record drawings for details of existing installation to familiarize themself with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the Contractor for any error or negligence on his part.

E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION

A. Disconnect mechanical systems in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by mechanical demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and remove from site and extend existing mechanical work under provisions of this Division and as indicated on the Drawings unless otherwise noted.

B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.

C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.

D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.

E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.

F. Remove all accessories above grade. When removing equipment or terminal devices all associated pipe, duct, ATC devices, wiring, etc. shall be removed and capped as required. Cut piping, duct, tubing, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.

G. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.

H. Patch all openings created by removal of mechanical equipment, ATC devices, ducts, pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar materials and finish unless otherwise noted.

I. Seal all existing roof penetrations, which will not be reused. Roof patching shall be by project roofing contractor, or an Owner approved roofing contractor.

J. Remove, relocate, or provide brackets, hangers, and other accessories as required.

K. Repair adjacent construction and finishes damaged during demolition and extension work.

L. Maintain access to existing mechanical installations, which remain active.

3.04 SALVAGE

A. All items removed from existing building shall be salvaged in a workmanlike manner.

B. The handling, storage, and disposition of salvage materials shall be as directed by the Architect. Generally, all salvage material shall remain the property of the Owner. Materials and equipment not wanted by Owner shall be removed from the job site and become the property of the contractor.

3.05 CLEAN AND REPAIR

A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.

B. All building surfaces damaged and openings left by new Work or the removal or relocation of mechanical equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

SECTION 23 01 00 - MECHANICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section applies to and forms a part of each of the sections of Division 23. This section, and each of the sections to which it applies, is subject to the requirements of the Instructions to Bidders, General Conditions, and Special Conditions of these complete specifications.

B. The work covered by this Division of the Specifications consists of furnishing all labor, supervision, equipment, materials, all incidentals, related items, and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.

C. All work shall be finished, tested and ready for operation.

1.02 DEFINITIONS

A. Words "Material" or "Furnish" where written in Division 23 specifications and drawings shall mean any and all apparatus, equipment, devices, fixtures, components, products, assemblies, items, parts, things, and any other pieces specified or shown or required.

B. Words "Labor" or "Install" where written in Division 23 specifications and drawings shall mean any and all physical effort, manpower, time, expertise, tools, equipment and services to carefully assemble, install and affix all material in a proper, complete and acceptable manner.

C. Word "Provide" where written in Division 23 specifications and drawings shall mean "Mechanical Contractor shall furnish all labor and material and completely and properly install such material and leave same in acceptable condition and intended acceptable working order".

1.03 DISCREPANCIES OR OMISSIONS FROM DRAWINGS OR DOCUMENTS

A. Notify the Engineer of any discrepancies in, or omissions from the drawings or documents. Neither the Owner nor the Architect will be responsible for any oral instructions or modifications of the specifications or drawings. Written interpretations will be made only by Addenda.

B. If discrepancies are not reported, the contractor shall bid the greater quantity or better quality (highest dollar value), and appropriate adjustment will be made after contract award.

C. Discrepancies discovered during construction shall immediately be called to the attention of the Architect/Engineer for clarification.

D. All minor items necessary for the completion and successful operation of the system, whether or not herein definitely specified or indicated on the drawings, shall be furnished and installed.

E. Omission of/or express reference to any material necessary for/or reasonably incidental to complete installation shall not release Contractor from providing such material. Where material is shown on drawings but is not specified or is specified but not shown, such material shall be considered both shown and specified.

F. Any work not clear to Contractor shall be referred to Engineer for clarification before bid is submitted. If no question is raised prior to opening of bid, Contractor shall be required to provide work in question as directed by Engineer, whose decision is final, without additional charges.

G. By virtue of submitting a bid, Contractor agrees that they are skilled and experienced in use of and in interpretation of drawings and specifications. Contractor further agrees that they have carefully reviewed all drawings, all specifications, and all addenda, which constitute bid documents for this contract, and finds them free of ambiguities and good and sufficient for bidding and construction purposes.

1.04 DRAWINGS

A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Furnish offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.

B. All piping and ductwork shall be routed so as not to obstruct access to other equipment (i.e. VAV box controls, electrical devices, fire alarm devices, etc.). Routing indicated on drawings is representative of intended location but shall be field verified. It shall be this contractor’s responsibility to coordinate with other trades for accessibility.

C. Any work or system on the roof not explicitly indicated on the roof plan shall be approved by the engineer prior to installing.

D. In general, the mechanical equipment drawings are drawn to scale as noted. Obtain dimensions and locations of partitions, walls, etc., from the Architectural drawings wherever possible and do not scale the mechanical drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.

E. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.05 SITE INSPECTION

A. Before submitting a proposal for the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themselves with all the existing conditions and limitations, including the extent of demolition, cutting, and patching to be done by the Contractor for Mechanical Work. No extras will be allowed because of the Contractor's misunderstanding as to the amount of work involved, or his lack of knowledge of any condition in connection with the work.

1.06 PRIOR APPROVAL REQUESTS

A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 10 days before receipt of bids.

B. The submission shall provide complete information, test, etc. relating to quality, performance, suitability, to determine acceptability of such products.

C. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known bidders.

D. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.

E. The cost of any changes of other trades as a result of use of the substitution material or equipment must be borne by the Contractor submitting such material or equipment.

1.07 REVIEW OF MECHANICAL MATERIALS AND EQUIPMENT

A. Within thirty (30) days after award of construction contracts, Contractor shall submit for acceptance to the Architect quantity of shop drawings specified for the equipment indicated in these specifications. The shop drawings shall include the equipment manufacturer's name and address, catalog designation or model number, rough-in data & dimensions, performance curves and rated capacities & operational characteristics.

B. The Contractor shall thoroughly review each item for compliance with these Specifications making any necessary corrections prior to submittal. Each shop drawing set shall be stamped, signed, and dated indicating Contractor review and submitted electronically via PDF file format. The PDF file name shall include the relevant specification section number for reference. If the Contractor fails to properly review shop drawings, the Contractor shall reimburse the Engineer for all additional reviews on a time and material basis.

C. Provide samples of materials or equipment proposed to be furnished, if requested. Samples shall become the property of the Architect/Engineer and will be returned only when accompanied by a written request to do so.

D. None of the items listed shall be purchased, delivered to the site, or installed, until the item is reviewed. No substitution will be permitted after review except where such substitution is considered by the Architect to be in the best interest of the Owner.

E. The Engineer will review all Shop Drawings submitted and will retain a copy for record file.

F. Approval Stamp: This review is to verify general conformance with the design concept of the Project and substantial compliance with the information provided in the Contract Documents. This review does not in any way relieve the Contractor or their suppliers of their responsibility to provide all materials and equipment as specified, in quantities, quality and dimensions required. Submittals will be reviewed with the following actions:

   1. "No Exception Noted" indicates that the Submittal appears to conform to the design concept of the Work and that the Contractor, at their discretion, may proceed with fabrication and/or procurement and installation.

2. "Make Corrections Noted" indicates that the Submittal, after noted corrections are made, appears to conform to the design concept of the Work and that the Contractor, at their discretion, may proceed with fabrication and/or procurement and installation, if the corrections are accepted by the Contractor without any increase in Contract Sum or Time.
3. "Revised and Resubmit" indicates that the noted revisions are such that a corrected copy of the Submittal is required for review to confirm that the noted revisions have been understood and made. The Contractor, at their discretion, may proceed with fabrication and/or procurement and installation after submitting a corrected copy and verifying with the reviewer that the corrected copy is acceptable, if the corrections are accepted by the Contractor without an increase in the Contract Sum or Time.
4. "Rejected" indicates that the Submittal does not appear to conform to the specifications, a resubmission is required, and fabrication or procurement is not authorized.

G. If the Engineer rejects (Revised and Resubmit or Rejected) the same section two times the engineer shall be compensated for additional reviews. Any subsequent submittal will require the inclusion of a check made out to the engineer in the amount of $500.00. Contractor is responsible for all delays caused by the resubmittal process.

H. Should the contractor fail to comply with any of the requirements of the preceding sub-paragraphs; then the right is reserved by the Architect to select any or all items in the material schedule, with that selection to be final and binding upon the contractor. The materials selected or reviewed, as the case may be, by the Architect, shall be used in the work at no additional cost to the Owner.

I. Connections and equipment clearances are based on the manufacturer scheduled. Any deviations in size, weight, and/or configuration shall be the responsibility of the contractor. Equipment by other approved manufacturers will be acceptable if of a similar type and grade and if of approximately the same general overall dimensions. Quality, construction and performance must be equal to or better than that specified.

J. When the contractor chooses to furnish any reviewed material or equipment that requires electrical specifications/connections (circuit breaker, conduit, wire, labor, etc.) different than shown and/or scheduled on the drawings, or specified in detail, the contractor shall be responsible for coordinating any necessary changes and shall bear the cost of such changes (including engineering costs).

1. Submit detailed documentation of all required changes, confirmation of coordination with the Electrical Contractor, and an estimated cost breakdown prior to ordering.

K. All contractor requested changes from the design, including size, weight, configuration, and electrical modifications, must be submitted for review and proof of coordination prior to approval.

1.08 PROPOSAL REQUESTS AND INSTRUCTIONS

A. For any proposal request or instruction that requires an adjustment to the Contract Sum, submit an itemized quotation for the change(s) described in the proposed modifications to the Contract Documents. Proposal shall also indicate credits, deducts, and/or offsets for material and labor originally included in contract.

1. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. Breakdown shall include amounts, lengths, quantities, types, sizes, etc. of material.
2. Indicate applicable taxes, O&P, delivery charges, equipment rental, and other incidental charges.
3. Include costs of labor and supervision directly attributable to the change.
4. All sub-contractor pricing shall include the same breakdown as described above.

1.09 WARRANTY

A. All equipment and installation shall be provided with a 1-year warranty beginning with substantial completion.

B. Refer to individual spec sections for specific warranty information that is different than stated above.

C. Submit warranty with related forms completed in Owner's name and registered with manufacturer.

1.10 MANUALS

A. In addition to catalog data and shop drawings submitted for review, this contractor shall furnish Operation and Maintenance Manuals for the mechanical systems. Manuals shall be delivered to the Architect before final observation of the work.

B. Operation and Maintenance Manuals shall be furnished in PDF electronic format .

C. Provide an index at the beginning of the manual for the sections included in the manual. Material shall be listed in specification sequence order.

D. Operation and Maintenance Manuals shall contain:

1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used.
2. Manufacturer's operating, parts list, maintenance, installation, lubrication and cleaning instructions.
3. Factory startup reports, test and balance reports.
4. Valve tag list.
5. Name and address of authorized service organization and parts depot.
6. Chemical Treatment Analysis Reports for heating & cooling systems.
7. Radiographic Testing Reports of welded pipe with picture of weld & location plan showing physical location of where test was performed.
8. A description of how the components of a given HVAC system interact within the large system. For example, circulating pumps, boilers, unit heaters are part of the "heating system".
9. A description of normal operating conditions for the system and its components.
10. A description of common symptoms of a malfunctioning system and likely causes.

11. Warranty letter from the automatic temperature controls contractor indicating the warranty period for their portion of the work.
12. Signed owner instruction forms for all items specified as requiring owners' instruction.
13. The Systems manual shall have an index and be broken up by individual systems such as "heating", "shop exhaust", "kitchen ventilation and exhaust", "chilled water", "administration ventilation".
14. Include at the front of the manual a complete listing of the Architect, Engineer and contractors and sub-contractors used on the project. Listing shall include names, addresses and phone numbers for each.
15. All major pieces of equipment shall be referenced with the equipment supplier's name, address and phone number shall be provided.

E. Operations and Maintenance Manuals shall be submitted to the Engineer for approval prior to delivery to the Architect.

1.11 INSTRUCTION OF OWNER'S EMPLOYEES

A. Furnish, without additional expense to the Owner, the services of competent instructors, who will give full instructions in the care, adjustment, and operation of all parts of the mechanical equipment to the Owner's employees who are to have charge of the equipment.

B. An operating and maintenance manual shall be made available to the Owner's operating personnel during the instruction and left with the Owner upon completion of the instruction.

C. The number of man hours of instruction furnished for each system shall be as specified below. Hours of instruction shall be divided up into a minimum of two (2) instruction periods with 75% of time used for an initial instruction and 25% of time used for a follow up instruction, a minimum of four (4) weeks after initial instruction.

D. Instruction of Owner's Employees" form at end of this section shall be filled out and signed by Contractor and Owner's Representative and three (3) signed copies of form sent to Engineer.

E. Owner training and instructions:

1. Ventilation systems including but not limited to terminal air units shall not be less than two (2) man hours.
2. Automatic temperature control systems including all components of the system shall be not less than 2 man hours.

1.12 INSTALLATION OF EQUIPMENT

A. All appliances and equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications. Auxiliary piping, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.

C. As a part of the work of this contract, the Mechanical Contractor shall make any changes in the pulleys, belts, and dampers, and shall install additional dampers required for correct balance as recommended by air balance agency, at no additional cost to the Owner.

D. The use of permanent HVAC systems for temporary heating, cooling, ventilating, and conditioning is strictly prohibited without written authorization from the Engineer.

1.13 RECORD DRAWING

A. The contractor shall maintain one set of drawings at the job site used as a master copy. Each change order or other revision, deletion, or addition shall be clearly marked and noted by colored pencil. This copy of plans shall be furnished to the Architect upon completion of the project.

B. The contractor shall note on the record drawings the elevations and/or inverts of all mechanical services (i.e., sewer, water, etc.) where they exit the building foundation. The contractor shall also record dimensions from the building to points on all mechanical equipment installed (ie., fuel tanks, oil piping, etc.).

C. A complete set of these drawings shall be scanned at a resolution of 600dpi in color and saved in an Adobe PDF portfolio format with index to each sheet by name and burned to a non-volatile media. The electronic copy of the as-built drawings shall be transmitted to the Engineer. After review and approval by the Engineer, the as-built drawings will be turned over to the Owner.

1.14 COOPERATION WITH OTHER TRADES

A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom, the Contractor shall off-set the piping and/or re-route the duct work where directed by the Engineer. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.15 INSPECTION OF SITE

A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize themselves with all of the existing conditions and limitations. No extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.16 PAVEMENT, CURB AND SIDEWALK REPLACEMENT

A. This Contractor shall be responsible for replacement of existing street pavement, curbs, and sidewalks, etc., removed or damaged by them during the course of the work, unless such pavement, curbs, sidewalks are to be constructed under the General Contract. The work shall be done in accordance with local requirements.

1.17 SALVAGE

A. All items removed from existing building shall be salvaged in a workmanlike manner.

B. The handling, storage, and disposition of salvage materials shall be as directed by the Architect. Generally, all salvage material shall remain the property of the Owner. Materials and equipment not wanted by Owner shall be removed from the job site and become the property of the contractor.

1.18 CODES, ORDINANCES, REGULATIONS & STANDARDS

A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.

B. All work shall conform to applicable state and local codes, ordinances, regulations and/or standards.

1.19 PERMITS AND LICENSES

A. This contractor shall obtain and pay for all licenses and permits and shall pay for all fees and charges for the connection to outside services and use of property other than the site of the work for storage of materials or other purposes.

B. Contractor shall coordinate and request all inspections from authority having jurisdiction. The Contractor shall notify the Architect of all such coordinated inspections (date & time) and shall submit certificates of inspection and final approval of the local inspection authority.

1.20 TESTS

A. Test all equipment installed under these specifications and demonstrate its proper operation to the Engineer.

B. Do not test or operate equipment for any purpose, until it has been fully lubricated in accordance with the manufacturer's instructions and, if it is a centrifugal pump, until it has been connected to the piping system with sufficient water so that it will not run dry.

C. Submit to the Engineer air balance and water balance reports indicating test results as hereinafter specified under Section 230593 "TESTING, ADJUSTING AND BALANCING FOR HVAC".

D. All testing shall be completed before final inspection, and test results shall be available during the final inspection.

1.21 GUARANTEES

A. This contractor shall guarantee all equipment, material, and workmanship for a period of one year from date of final certificate. Any defects in mechanical equipment, workmanship or materials that appear, or cause trouble of any kind within a period of one year from date of final certificate shall be remedied, free of charge. Refer to other sections of these specifications for guarantees in excess of the requirements herein described.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 INSTRUCTION TO OWNER'S EMPLOYEES FORM

DATE _____

INSTRUCTION OF OWNER'S EMPLOYEES

This letter shall certify that the Contractor has furnished the Owner with full instructions in the care and operation of all parts of the mechanical system as specified under Section 23 0100 paragraph entitled "Instruction of Owner's Employees".

	Owner's Initial Instructions			Owner's Follow-up Instructions		
Section	**Hours**	**Date**	**Initials**	**Hours**	**Date**	**Initials**
Ventilation						
Temperature Control						

END OF SECTION

SECTION 23 01 50 - MECHANICAL MATERIALS & METHODS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section covers basic materials and methods and applies to and forms a part of each of the sections of Division 23.

B. This work shall be in accordance with this and other applicable sections and/or provisions of these specifications and with the applicable drawings.

1.02 COORDINATION OF OPENINGS

A. This contractor shall coordinate all openings required for new piping, ductwork, equipment, controls, etc. through any structural slabs, beams, or walls. Contractor shall request a copy of the precast concrete shop drawings and verify locations and sizes of all openings required.

B. All costs associated with structural field changes or redesigns of the building systems due to lack of field coordination shall be responsibility of this contractor.

1.03 MATERIALS & MANUFACTURERS

A. All materials and equipment shall be new, free of defects, installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practice of the industry.

B. Certain materials and/or equipment in this specification are specified by manufacturer and catalog numbers. The design was based on the specified equipment and establishes a degree of quality, performance, physical configuration, etc. If the contractor should elect to use equipment other than the equipment used as a basis for design but listed as "acceptable" in the specifications, he shall be responsible for space requirements, configuration, performance, and changes in bases, supports, vibration isolators, structural members, openings in structure and other apparatus that may be affected by its use.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Piping is to be installed as shown on the drawings as much as practical. When a pipe size is not indicated, the subcontractor shall request the pipe size from the Architect through the Mechanical Contractor.

B. Provide sufficient swing joints, expansion loops, and/or devices necessary and install so as to permit free expansion and contraction of piping without causing undue stresses. Make all changes in direction with fittings. Support piping independently at all equipment so that its weight shall not be supported by the equipment.

C. Install piping without springing or forcing and clear all windows, doors, and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted.

D. All pipes shall be reamed to full pipe diameter before joining.

E. Install vertical risers plumb and straight, horizontal lines parallel with walls and partitions. Conceal piping above ceilings and within furring and/or walls (finished construction).

F. Provide shut-off valves and unions suitably located to isolate each item of equipment, branch circuit or section of piping.

G. Provide solid head plugs on any crosses, tees, etc., located in the piping around the boilers.

H. Provide drain valves at all low points of each system to enable complete drainage. Drain shall consist of a 3/4" ball valve with hose end.

I. Provide a manual air vent consisting of 1/2" ball valve with hose end installed on a "T" at all high points of each system to enable complete venting.

J. All piping shall be adequately supported from the building structure with adjustable hangers to maintain uniform grading where required and to prevent sagging or pocketing.

K. Provide supports between piping and building structure where necessary to prevent swaying.

L. The use of wire or perforated metal to support pipe will not be permitted.

2.02 SUPPORTING STEEL

A. Provide structural steel framework for supporting mechanical equipment as required.

B. All steel work shall be in conformance with the requirements of the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings. Material shall conform to ASTM A36.

PART 3 EXECUTION

3.01 PROTECTION, DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for the delivery and storage of materials and make the required arrangements with other contractors for the introduction into the building of equipment too large to pass through finished openings.

B. Protect materials and equipment stored on site from weather and moisture by maintaining factory covers and/or suitable weather-proof coverings. For extended outdoor storage, motors shall be removed from equipment and stored separately.

C. The open ends of all piping and ductwork shall be covered whenever that system is not being worked on, i.e., end of the workday, completion of a section, etc. Covering shall keep dust, garbage, vermin, and other foreign objects out of the piping or ductwork when the contractor is not on the jobsite.

3.02 CUTTING AND REPAIRING

A. All holes and penetrations required for the installation of the mechanical equipment shall be by the mechanical contractor. This shall include all piping, ductwork, and any other penetration through the wall, floor, or roof.

B. Cutting construction shall be done only with the written permission of the Architect. Cutting shall be done carefully and damage to buildings, pipes, wiring, or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved at no additional charge to the Owner. This Contractor shall be responsible for all cutting and patching unless such work has been delegated to the General Contractor.

C. All holes cut into concrete shall be cut by means of power saws or core drills. All unsightly spalls or chips shall be repaired.

D. All openings remaining around duct and pipe penetrations shall be filled, caulked, and painted to match wall. Code approved fire caulking shall be used for all rated penetrations.

3.03 SEALING FLOOR, CEILINGS AND WALL OPENINGS

A. Where pipes or ducts pass through walls, ceilings, floors, or partitions, (other than those through fire rated walls or chases) the opening in the construction around the pipe or duct shall not exceed ½ inch average clearance on all sides and shall be sealed to prevent the passage of sound and air. Coordinate wall openings to allow insulation thickness to pass through walls if allowed.

B. The material used to seal space between the wall and the pipe/duct shall be non-combustible caulk type, or wrap type, as conditions require. Provide sheet metal angles or flanges as may be required to contain the stopping material. Use of expanding foam will be allowed if surfaces are cleaned of an excess material and all edges are trimmed smooth. Penetrations through exterior walls shall be sealed weather tight.

C. Duct coverings shall not extend through walls or floors required to be fire-stopped or have a fire resistance rating. Insulation shall be taped or sealed to the walls to eliminate sweating at any fire and/or smoke dampers.

D. Acceptable manufacturers shall be Hilti, 3M Brand, or a prior approved product.

3.04 CLEANING AND PAINTING

A. Clear away all debris, surplus materials, etc., resulting from work or operations, leaving the job and equipment furnished under this contract in a clean condition.

B. All exposed ductwork visible behind grilles, registers or air terminals shall be painted flat black.

C. All equipment being furnished with finished paint coat shall be examined upon job completion for scratches and other surface damage. All finished surfaces where necessary shall be touched up with touch-up paint of color to match the factory finish.

3.05 ASBESTOS FREE BUILDING

A. There shall be no products or building materials used as a temporary or permanent element in the construction of this building, which has in its make-up any form of asbestos. The contractors shall be responsible to monitor shop drawings and product literature to verify the make-up of materials to be used in the building and remind material suppliers that their products must be asbestos free.

B. Notify the Architect immediately of any existing materials which are suspected of containing asbestos. Do not disturb or attempt to remove any asbestos containing material. The Architect will contact the Owner and inform them of the Contractors observations. The Owner will obtain and provide the services of professionals skilled in asbestos removal.

3.06 SALVAGE

A. All items removed from existing building shall be salvaged in a workmanlike manner.

B. The handling, storage, and disposition of salvage materials shall be as directed by the Architect. Generally, all salvage material shall remain the property of the Owner. Materials and equipment not wanted by Owner shall be removed from the job site and become the property of the contractor.

END OF SECTION

SECTION 23 05 23 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ball valves.

1.02 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard; 2025.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

E. ASME B31.9 - Building Services Piping; 2020.

F. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

G. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service; 2021.

H. AWWA C606 - Grooved and Shouldered Joints; 2015.

I. MSS SP-45 - Drain and Bypass Connections; 2020.

J. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Closeout Documents:

1. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
2. Project Record Documents: Record actual locations of valves.

1.04 QUALITY ASSURANCE

A. Manufacturer:

1. Obtain valves for each valve type from single manufacturer.
2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.

B. Use the following precautions during storage:

1. Maintain valve end protection and protect flanges and specialties from dirt.
    a. Provide temporary inlet and outlet caps.
    b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
    a. Store valves indoors in dry environment.
    b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:

1. Handle large valves with sling, modified to avoid damage to exposed parts.
2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C. Provide the following valves for the applications if not indicated on drawings:

1. Throttling (Hydronic): Ball.
2. Isolation (Shutoff): Ball.

D. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.

E. Required Valve End Connections for Non-Wafer Types:

1. Steel Pipe:
    a. Size 2 inch and Smaller: Threaded ends.
    b. 2-1/2 NPS and Larger: Grooved or flanged ends.
2. Copper Tube:
    a. Size 2 inch and Smaller: Threaded ends, except solder-joint valve-ends.
    b. Size 2-1/2 inch and Larger: Grooved ends.

F. Heating Hot Water Valves:

1. 2 NPS and Smaller, Bronze Valves:

a. Threaded or soldered ends.

b. Ball: Full port, two piece, brass trim.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:

1. Hand Lever: Quarter-turn valves 6 NPS and smaller.

D. Valves in Insulated Piping: Provide 2 inch stem extensions and the following features:

1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

2. Memory Stops: Fully adjustable after insulation is installed.

E. Memory Stops: Fully adjustable after insulation is installed.

F. Valve-End Connections:

1. Threaded End Valves: ASME B1.20.1.

2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.

3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.

4. Solder Joint Connections: ASME B16.18.

5. Grooved End Connections: AWWA C606.

G. General ASME Compliance:

1. Building Services Piping Valves: ASME B31.9.

H. Bronze Valves:

1. Fabricate from dezincification resistant material.

2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Valve Bypass and Drain Connections: MSS SP-45.

J. Source Limitations: Obtain each valve type from a single manufacturer.

K. Valve Manufacturers (unless otherwise noted)

1. Apollo Valves

2. NIBCO

3. Milwaukee

4. Hammond

5. Jomar

6. Watts

2.03 BRONZE, BALL VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Bronze or Brass Trim:

1. Comply with MSS SP-110.
2. Stem: Bronze or brass.
3. Ball: Chrome plated brass.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

END OF SECTION

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe/Duct markers & stencils.

E. Ceiling markers/tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2025.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide manufacturers catalog literature for each product required.

C. Closeout Documents:

1. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
2. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Terminal Units: Nameplates.

B. Automatic Controls: Tags. Key to control schematic.

C. Ductwork: Duct Markers.

D. Instrumentation: Tags.

E. Piping: Pipe Markers.

F. Thermostats: Nameplates.

G. Valves: Tagsand/or ceiling tacks where located above a finished ceiling..

2.02 NAMEPLATES

A. Manufacturers:

1. Brimar Industries, Inc: www.pipemarker.com/#sle.
2. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.

4. Seton Identification Products, a Tricor Direct Company: www.seton.com.

B. Letter Color: White.

C. Letter Height: 1/2 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:

1. Brady Corporation: www.bradycorp.com.
2. Brimar Industries, Inc: www.pipemarker.com/#sle.
3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
5. Seton Identification Products, a Tricor Company: www.seton.com.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 STENCILS

A. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. Ductwork and Equipment: 2-1/2 inch high letters.

2.05 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation: www.bradycorp.com.
2. Brimar Industries, Inc: www.pipemarker.com/#sle.
3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
5. Seton Identification Products, a Tricor Company: www.seton.com.

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Color code as follows:

1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
2. Toxic and Corrosive Fluids: Orange with black letters.

3. Compressed Air: Blue with white letters.
4. Flammable and oxidizing fluids: Yellow with black letters.

2.06 CEILING TACKS/MARKERS

A. Manufacturers:
1. Craftmark: www.craftmarkid.com.
2. Moore
3. Seton

B. Description: Sticker with 3/4 inch diameter color coded head.
1. Color code as follows:
a. Fire Dampers and Smoke Dampers: Red.
b. Heating/Cooling Valves: Yellow.
c. Flammable Fluid Valves:

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Piping shall be identified as to contents using the following list:

Glycol Hot Water Heating Supply	GHWS
Glycol Hot Water Heating Return	GHWR

B. Ductwork shall be identified as indicated below. Ductwork label shall also include the equipment served.

Supply Air	Supply
Return Air	Return

C. Valves controlling mains, risers and branches, but not individual shut-off or local control valves on equipment, shall be identified by a tag. Schedules, framed under glass and mounted where directed, shall be provided showing a complete listing of all valve tags and giving numbers, locations, and color codes, if any, of pipes controlled. Frames shall be secured to wall by not less than four screws.Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

D. Install tags with corrosion resistant chain.

E. Install plastic pipe and duct markers in accordance with manufacturer's instructions.

F. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

G. Equipment serving different areas of a building other than where they are installed shall be permanently marked in an approved manner that uniquely identifies the equipment and the area it serves.

H. For insulated pipes and ducts, marker size shall be based on insulation size, not pipe or duct size.

1. Identify service, flow direction, and pressure.

I. Locate ceiling tacks/markers to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic systems.

C. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2024, with Errata (2025).

C. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems; 2019, with Errata (2022).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2023.

1.03 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent who conforms to the standards set forth by either AABC, NEBB or TABB.

1.04 PREINSTALLATION CONFERENCE

A. 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.

1. Agenda Items: Include at least the following:
    a. Submittal distribution requirements.
    b. Contract Documents examination report.
    c. Testing, adjusting, and balancing plan.
    d. Work schedule and Project site access requirements.
    e. Coordination and cooperation of trades and subcontractors.
    f. Coordination of documentation and communication flow.

1.05 COORDINATION

A. 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.

B. Provide 7 days' advance notice for each test. Include scheduled test dates and times.

C. Perform testing adjusting and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.06 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Prior to testing, adjusting and balancing the system, the Contractor shall submit 2 copies of the proposed test report forms for engineer's approval.
2. 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.
3. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.. Submit 2 copies of the NEBB or AABC certificate for each member of the testing, adjusting, and balancing Agent team
4. TAB Plan: Submit 2 copies of a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
    a. Submit to Engineer.
5. Include at least the following in the plan:
    a. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    b. Identification and types of measurement instruments to be used and their most recent calibration date.
    c. Final test report forms to be used.
    d. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Closeout Documents:

1. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
    a. Units of Measure: Report data in I-P (inch-pound) units only.
    b. Include the following on the title page of each report:
        1) Name of Testing, Adjusting, and Balancing Agency.
        2) Address of Testing, Adjusting, and Balancing Agency.

3) Telephone number of Testing, Adjusting, and Balancing Agency.

4) Project name.

5) Project location.

6) Project Engineer.

7) Project Contractor.

8) Project altitude.

9) Report date.

10) Signature of testing, adjusting, and balancing Agent who certifies the report.

c. Summary of contents, including the following:

1) Design versus final performance.

2) Notable characteristics of systems.

d. Description of system operation sequence if it varies from the Contract Documents.

e. Notes to explain why certain final data in the body of reports vary from design values.

2. Instrument Calibration Reports: For instrument calibration, include the following:

a. Instrument type and make

b. Serial number.

c. Application.

d. Dates of use.

e. Dates of calibration.

3. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

1.07 WARRANTY

A. Test and balance agency shall include an extended warranty of 90 days, after completion of the test and balance work, during which time the Engineer at his discretion may request a recheck, or resetting of any outlet, supply air fan, or exhaust fan as listed in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:

1. AABC (NSTSB), AABC National Standards for Total System Balance.

2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.

3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
4. SMACNA (TAB).
5. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:

1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:
   a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guarantee.
   b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
   c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

1. 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.
2. Systems are started and operating in a safe and normal condition.
3. Temperature control systems are installed complete and operable.
4. Proper thermal overload protection is in place for electrical equipment.
5. Final filters are clean and in place. If required, install temporary media in addition to final filters.
6. Duct systems are clean of debris.
7. Air coil fins are cleaned and combed.
8. Access doors are closed and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is minimized.

11. Hydronic systems are flushed, filled, and vented.
12. Service and balance valves are open.
13. Examine automatic temperature system components to verify the following:
    a. Dampers, valves, and other controlled devices operate by the intended controller.
    b. Dampers and valves are in the position indicated by the controller.
    c. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in mixing boxes, and variable-air-volume terminals.
    d. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.
    e. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
    f. Sensors are located to sense only the intended conditions.
    g. Sequence of operation for control modes is according to the Contract Documents
    h. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
    i. Interlocked systems are operating.
    j. Changeover from heating to cooling mode occurs according to design values.
14. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine Project record documents described in Division 1 Section "Project Record Documents."

D. 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.

E. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

F. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Any changing of pulley sizes if found necessary when testing systems, shall be done by this contractor. Any additional dampers which may be found necessary to get proper air supply and quantity shall be furnished by this contractor at no expense to the Owner

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so design conditions for system operations can be met.

3.04 ADJUSTMENT TOLERANCES

A. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

B. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:

1. Running log of events and issues.
2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.06 AIR SYSTEM PROCEDURE

A. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

B. Measure air quantities at air inlets and outlets.

C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

G. Balancing dampers shall be adjusted to minimize noise through VAV box by adjusting the balancing damper as required so the motorized damper in the VAV box is no greater than 25% closed to achieve minimum design airflow rate. Balancing damper handles shall be secured once balancing is completed to ensure dampers will remain in place after balancing is complete. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

H. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

I. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

A. Test, adjust, and balance the following:

1. Air Terminal Units.
2. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

A. Terminal Unit Data:

1. Manufacturer.
2. Type, constant, variable, single, dual duct.
3. Identification/number.
4. Location.
5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.
10. Maximum actual air flow.
11. Inlet static pressure.

B. Air Distribution Tests:

1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

END OF SECTION

SECTION 23 07 13 - DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:

1. Knauf Insulation: www.knaufinsulation.com.

2. Johns Manville: www.jm.com.
3. Owens Corning Corporation: www.ocbuildingspec.com.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
1. K value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 250 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure-sensitive tape.

D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test ductwork for design pressure prior to applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Supply duct shall mean all supply ducts from air handling unit discharge to air outlet (diffuser, register, etc.). This includes all non insulated devices such as terminal coils, distribution boxes, air flow measuring stations, sound attenuators, linear slot plenums, etc. installed in the supply or return duct system. Duct insulation shall extend uninterrupted through all walls with the exception of those containing fire and/or smoke dampers. Coordinate with the installing mechanical contractor(s) at the start of the project to ensure holdouts in walls, where required, are oversized to allow for full insulation thickness to be applied.

D. All supply ducts passing through spaces without ceilings and not feeding that space shall be insulated as specified.

E. HVAC ductwork routed exposed in the area it serves shall not be insulated with the following exceptions:
1. High temperature process air ductwork shall be insulated as described above.
2. Ductwork with air temperatures below 50 degrees F shall be insulated as described elsewhere in this section.

3. HVAC ductwork in spaces with garage door openings directly to the building exterior shall be insulated as described above.

F. Insulated ducts conveying air above and below ambient temperature:

1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

G. Glass fiber - flexible installation:

1. End and longitudinal joints shall be butted firmly and lapped and sealed by adhesive.
2. Mechanical fasteners shall be installed on sides and bottom of ducts spaced at the rate of not less than one fastener per two lineal feet.
3. A single mechanical fasteners shall be installed on any duct width of 24" or larger, two fasteners for 48" or larger, three fasteners for 72" or larger, etc.
4. At all joints, the vapor barrier jackets shall be covered with 5" wide pressure sensitive vapor seal tape, or shall have 2.5" wide laps drawn tight, stapled, and secured with vapor barrier adhesive.
5. The joints and all openings where facing is pierced or punctured by pins, staples, etc. shall be coated with two inch wide strips of vapor barrier coating compound.

H. Glass fiber - rigid installation:

1. Rigid board fiberglass shall be furnished with a reinforced foil faced vapor barrier jacket. Insulation shall be protected at corners and edges with metal corner strips or clips.

3.03 SCHEDULES

A. **Air Handling Units**

Ductwork System	**Insulation Type**	**Insulation Thickness**	**Density**
Supply Duct	Glass fiber flexible	2.2 inch (R value - 6)	3/4 lb/ft^3
Return Duct	None	None	None

END OF SECTION

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2024).

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2025.

D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

A. Manufacturers:

1. CertainTeed Corporation: www.certainteed.com.
2. Johns Manville Corporation: www.jm.com.
3. Knauf Insulation: www.knaufinsulation.com.
4. Owens Corning Corporation: www.ocbuildingspec.com/sle.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.
4. Density 4 lb.

C. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.

1. K Value: ASTM C177, 0.23 at 75 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

E. Vapor Barrier Lap Adhesive: Compatible with insulation.

F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated Pipes Conveying Fluids Below Ambient Temperature:

1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:

1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. Provide Elastomeric Foam Insulation for all piping concealed in equipment cabinets for fan coils, induction displacement units, and unit heaters. Insulation thickness shall be as noted in schedules below.

F. Flexible Elastomeric Foam Insulated Pipes Conveying Fluids Below Ambient Temperature:

1. Insulation Installation on Straight Pipes and Tubes:

a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

c. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.

d. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

2. Insulation Installation on Pipe Flanges:

a. Install preformed pipe insulation to outer diameter of pipe flange.

b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.

d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

3. Insulation Installation on Pipe Fittings and Elbows:

a. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

b. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

4. Insulation Installation on Valves and Pipe Specialties:

a. Install preformed sections of cellular-glass insulation to valve body.

b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

c. Install insulation to flanges as specified for flange installation application.

G. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:

1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:

1. All piping 1-1/2" and smaller, no insert is required below the insulation. Saddles shall be provided for all insulated piping. Both inserts and saddles shall be provided for all piping 2" and larger.
2. A pipe insulation protection saddle of 22 gauge galvanized sheet metal for piping 3" diameter and smaller, and 18 gauge for piping larger than 3" diameter, shall be provided at supports where pipe is supported by the insulation or inserts. The saddle shall be at minimum length of 12 inches.
3. Pipe supports for piping which operates below 250°F shall made be high density phenolic foam pipe insulation similar to Tru-Balance 2550FS saddles as manufactured by Buckaroos, Inc. Insulation in saddles shall meet ASTM E-84 ratings for 25 flame and 50 smoke.
4. Insert Material (for piping that operates above 250 degrees F): Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

3.03 SCHEDULE

A. Glycol Heating Supply and Return Systems

1. Supply and Return: Glass Fiber, Rigid.

Service	**Pipe Size**	**Insulation Thickness**
105F to 200F	1-1/4 inch and less	1-1/2 inch
	1-1/2 inch and greater	2 inch

2. For piping smaller than 1-1/2" and located in partitions within conditioned spaces, reduction of these thicknesses by 1" shall be permitted, but not to a thickness less than 1".

END OF SECTION

SECTION 23 09 13 - INSTRUMENTS AND CONTROL ELEMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermostats.

B. Control valves.

C. Electronic valve actuators

D. Temperature sensors

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
2. Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system. For variable frequency drives: indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

C. Closeout Documents:

1. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
2. Project Record Documents: Record actual location of control components, including panels, thermostats, and sensors.
    a. Revise shop drawings to reflect actual installation and operating sequences.
3. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this sectionwith minimum ten (10) years experience approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store equipment in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle equipment in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

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

2.02 CONTROL VALVES

A. Control valves shall be 2-way or 3-way (mixing or diverting) as indicated in drawings. Pressure drop through water valves shall be 120% of the pressure drop through the controlled equipment with a maximum of 5 psi pressure drop. Pressure drop through medium pressure steam valves with atmospheric returns shall be 80% of inlet steam pressure.

B. Ball Valves, 1/2 through 2 in.:

1. Ball Valves shall have forged brass bodies. Valves shall have available either Chrome Plated Brass Balls or 300 Series Stainless Steel Balls in all sizes. Valves shall have available either Nickel Plated Brass Stems or 300 Series Stainless Steel Stems with a blow-out proof stem design in all sizes.
2. Valves shall have Graphite reinforced Polytetrafluoroethylene (PTFE) seats with Ethylene Propylene Diene Monomer (EPDM) O-ring backing. Stem seals shall be double EPDM O-rings.
3. Flow Characterization Disk shall be rated for 50 psid maximum differential pressure and shall be inserted against the casting of the valve.
4. All ball valves with internal pipe thread end connections shall be rated to 580 psi maximum static pressure at 203°F fluid temperature. All ball valves with sweat end connections or press end connection shall be rated to 300 psig maximum static pressure at 203°F fluid temperature
5. All valves shall be rated for service with hot water, chilled water and 50% glycol solutions. Ball Valves with stainless steel balls and stems shall be rated for use with 15 psig saturated steam. Valves shall be rated for 200 psid closeoff pressure. Flow Characteristics shall be equal percentage on the control port. Bypass port on three-way valves shall have linear flow characteristics.

C. Temperature control valves shall be located within 24" and in the same room as the piece of equipment that it serves. This includes fin tube, unit heaters, coils, etc. Any deviation from this must be cleared with the contracting officer.

2.03 ELECTRONIC VALVE ACTUATORS

A. Select actuator for full shutoff at maximum pump differential pressure or for maximum torque required for proper damper close off. Actuators shall be either two position or modulating based on the sequence of operations.

1. Two position actuators shall be provided with synchronous motor with enclosed gear train, dual-return springs, and valve-position indicator. Actuators shall fail to last position. Two position control valves shall be low pressure drop type valves.
2. Modulating actuators shall be self-contained, linear motor, actuator with 60-second full travel, with transformer and single-throw, double-pole contacts. Actuators shall fail as noted below.

B. Valve actuators shall be UL-recognized or CSA-certified. Provide valve actuators as noted in the following:
1. Provide spring return normally open actuators on air handling unit heating valves.
2. Provide spring return normally closed actuators on chilled water valves.
3. Actuators serving steam valves, radiation valves, and terminal devices shall fail to last position.

2.04 TEMPERATURE SENSORS

A. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.

B. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, two-wire 1000 ohm platinum RTD, or 20 kohn NTC.

C. Room Temperature Sensors:
1. Room sensors shall be constructed for either surface or wall box mounting.
2. Room sensors in private/staff controlled spaces shall have an integral LCD display with the following capabilities:
a. Display room air temperatures.
b. Display and adjust room comfort set point.
c. Timed override request push button with LED status for activation of after-hours operation.
d. Display controller mode.
e. Password selectable adjustment of set point and override modes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

H. Verify that surface is suitable for controller installation.

I. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount thermostats or temperaure sensors on interior walls.

1. If thermostats or sensors must be mounted on exterior wall, provide insulated sub-base.

C. Provide separable sockets for liquids and flanges for air bulb elements.

D. Provide valves with position indicators and with pilot positioners where sequenced with other controls.

E. Mount control panels adjacent to associated equipment on vibration free walls or free-standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

F. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

3.03 MAINTENANCE

A. Provide service and maintenance of control system for one year from Date of Substantial Completion.

B. Provide complete service of controls systems, including call backs, and submit written report of each service call.

C. In addition to normal service calls, make minimum of seasonal complete normal inspections of approximately four hours duration to inspect, calibrate, and adjust controls.

SECTION 23 09 23 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System description.

B. Operator interface.

C. Controllers.

D. Power supplies and line filtering.

E. BACNET capabilities.

F. System software.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 ADMINISTRATIVE REQUIREMENTS

A. The Automatic Temperature Controls Contractor shall coordinate with the project Balancing Contractor & Chemical Treatment Contractor for control software access necessary to facilitate the balancing & flushing processes. The Automatic Temperature Controls Contractor shall allow full building system software access to the project balancing contractor during construction and project commissioning as necessary. The Automatic Temperature Controls Contractor shall provide an override button available to the Balancing and Chemical Treatment Contractor that will drive open all control valves for the purpose of flushing & balancing the hydronic system(s). All water coils shall be opened to the system prior to the air system start-up to ensure proper mixing of gylcol throughout the piping system. The Automatic Temperature Controls Contractor shall provide up to 12 hours of assistance for navigation and use of software as required.

1.04 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data and Shop Drawings: Contractor shall provide shop drawings or other submittals on all hardware, software, and installation to be provided. No work may begin on any segment of this project until submittals have been reviewed and approved for conformity with the design intent. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Submittals shall include:

2. Direct Digital Control System Hardware:
    a. A complete bill of materials of equipment to be used shall be listed indicating quantity, manufacturer, model number, and other relevant technical data.
    b. Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions shall be included for all relevant items including but not limited to: direct digital controller and all controller panels; transducers/transmitters; sensors including accuracy data; actuators; valves; relays/switches; control panels; power supply; batteries; operator workstation equipment; wiring; wiring diagrams and layouts for each control panel; Schematic diagrams for all field sensors and controllers with floor plans of all sensor locations and control hardware.
3. Central System Hardware and Software
    a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and other relevant technical data.
    b. Manufacturer's description and technical data, such as product specification sheets and installation/maintenance instructions shall be included for all relevant items including but not limited to: central processing unit (CPU); monitors; keyboard; uninterruptible power supply; interface equipment between CPU and control panels; operating system software; operator workstation software; color graphic software; and third-party software.
    c. A schematic diagram for all control wiring, communication wiring and power wiring shall be provided. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers, function and data link protocol(s). Show all interface wiring to the control system.
    d. Provide detailed riser diagrams of wiring between central control unit, operator workstation(s), routers, gateways and all control panels.
    e. A list of the color graphic screens shall be provided. For each screen, provide a conceptual layout of pictures and data, and show or explain which other screens can be directly accessed.
4. Controlled Systems:
    a. A schematic diagram of each controlled system. The schematics shall have all control points/objects labeled and with point/object names shown or listed. The schematics shall graphically show the location of all control elements in the system.
    b. A schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, it shall be labeled with the same name. All terminals shall be labeled

c. An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number.

d. A mounting, wiring, and routing plan view drawing. The drawing shall be done in ¼" scale. The design shall take into account HVAC, electrical and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work

e. A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.

f. A point/object list for each system controller including inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc.

C. Closeout Documents:

1. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

D. Direct digital control panels shall comply with Federal Communications Commission (FCC) Regulation, Part 15, Subpart J, for Class A computing devices.

E. All wiring shall be in accordance with the current National Electrical Code and all local electrical codes.

F. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.06 WARRANTY

A. Correct defective Work within a two year period after Substantial Completion.

B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Johnson Controls, Inc. - Metasys

2.02 SYSTEM DESCRIPTION

A. An existing DDC building automation system manufactured by Johnson Controls is currently in the building. The system shall be expanded to accomodate the new work under this project including but not limited to:

1. Expand the existing network to accomodate the additional points and communcation.
2. Upgrade and add graphics for additional control points, integrating both existing graphics and new graphics into a unified interface.
3. Provide additional processing power and memory for additional points.

B. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.

C. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.

D. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.

E. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units. Individual terminal unit control is specified in Section 23 09 13.

F. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

G. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

2.03 BAS SYSTEM ARCHITECTURE

A. Automation Network

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard “off the shelf” products available through normal PC vendor channels. Automation network shall support both IPv4 and IPv6 protocols.
2. A temporary Automation network solution will be required to be installed by the BMS Contractor prior to the completion of the Owner's IT network. The temporary network shall provide remote access to the BMS for programming, commissioning, graphics loading and binding, and for access by the contract team. The temporary network shall link together all Network Engines via ethernet CAT6 cable and temporary un-managed switches. One Network Engine shall serve as the system “Master” and shall have a cellular modem to communicate with a remote cloud-based server that is used for all functionality outlined. Once the Owner's IT network is installed and commissioned, the temporary network shall be de-commissioned and Owner's IT data drops shall be permanently connected to the BMS Server, all Network

Engines and Ring Management appliances. The database from the temporary server shall be transferred to the permanent server and checked for proper on premises operation.

2.04 CONTROLLERS

A. General Requirements:

1. For all controllers, provide password protected access for local or remote access of controllers to modify programming in addition to setpoint changes.
2. The ethernet equipment controller shall employ finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.
3. Ethernet equipment controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
4. Secure Boot – The Network Engine(s) shall prevent malicious or unauthorized software applications from loading during the system startup process.
5. User Authentication – The Network Engine(s) shall support local user authentication.
6. Password Security – Access to the Network Engines' embedded user interface shall require a password of 8 to 50 characters including a minimum of one lower case letter, one upper case letter, one number, and one special character. An alarm shall be generated after three unsuccessful attempts within 15 minutes, and the user shall be denied access until permission is renewed by a system administrator.
7. Network Security – Communication between the Network Engine and other system networked devices including additional Network Engines, Application and Data Servers, Open Data Servers (BACnet listed OWS), and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates.
8. Hardware Real Time Clock – The Network Engine(s) shall include an integrated, hardware-based, real-time clock, with a supercapacitor to maintain time for a minimum of 72 hours during a power loss. Controllers using a battery to maintain time during a power loss shall not be acceptable.

B. SUPERVISORY NETWORK CONTROLLERS:

1. Supervisory network controllers shall be used to manage and schedule global control strategies on the network and communicate with the local Operator's Workstation. A minimum of one (1) supervisory network controller shall be used for the direct digital control system. Each supervisory network controller shall include its own microprocessor, program and data memory, power supply, network communications

module, and battery. Supervisory network controllers may also include input/output modules and shall be capable of sharing its point and data information with other controllers on the network.

C. TERMINAL UNIT CONTROLLERS:

1. Terminal unit controllers shall be used to control all small HVAC terminal unit equipment such as variable air volume boxes, dual duct boxes, heat pumps, fan coil units, unit ventilators, terminal coils, etc. A minimum of one (1) terminal unit controller shall be used for each terminal unit.
2. This contractor shall provide a NEMA 1 enclosure for any controllers furnished.
3. Each terminal unit controller shall include its own microprocessor, program and data memory, power supply, input/output modules, and battery. All program and data memory shall be read/write random access memory (RAM) type with non-volatile memory similar to EEPROM (Electrically Erasable Programmable Read-Only memory). Upon the resumption of normal power, the runtime control software shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.
4. Each terminal unit controller shall be capable of sharing point and data information with other controllers, such that control sequences or control loops executing in one controller may receive input signals from sensors connected to other controllers on the network. If the network communication link fails or the originating controller malfunctions, the control loop shall continue to function using the last value received from the failed controller. Failure of one controller shall have no other effect upon any of the other controllers in the network.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 09 93.

C. Provide required line voltge wiring including breakers, conductors, conduit, transfromers, disconnects and all required accessories to support control systems.

D. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

E. Controllers shall be mounted in NEMA 1 enclosures near the equipment served. If multiple controllers are installed in a single enclosure, the controller shall be noted as to the location and equipment served along with a tag on the controlled equipment as to the location of the controller if not within the same room.

F. Install software in direct digital control panels and Operator's Workstation. Implement all features of programs to specified requirements and appropriate to sequence of operation.

G. Connect and configure equipment and software to achieve the sequence of operation specified.

H. Verify location of room sensors, thermostats, humidistats, and other exposed control sensors with plans and room details before installation. Locate 48 inches above floor.

I. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

J. Install labels and nameplates to identify control components including the following:

1. Control cabinet nameplates
2. Control valve tags
3. Control damper labels
4. Sensor tags

3.03 CONNECTION TO OWNER'S DATA SYSTEM

A. This contractor shall be responsible for the installation of all data wiring, conduit, terminations, etc., to connect the temperature controls system into the owner's data network. This contractor shall coordinate the location of the data system connection point, network protocols, and network address with the owner's IT personnel before starting work.

B. If multiple data connections are required (i.e., multiple ATC panel locations), the ATC contractor shall be responsible for each of the connections necessary.

C. All costs associated with the installation of the required data connections shall be borne by this contractor.

3.04 BACNET CONNECTIONS TO OTHER EQUIPMENT

A. This contractor shall coordinate the BACnet protocol and all wiring between the temperature control system and furnished equipment manufacturer.

B. This contractor shall coordinate the connection protocol (MS/TP of IP) with the equipment manufacturer and/or supplier.

C. This contractor shall be responsible for the installation of all data wiring, conduit, terminations, etc., to connect the temperature controls system into equipment control panel. This contractor shall coordinate the location of the data system connection point, network protocols, and network address before starting work.

D. All costs associated with the installation of the required data connections shall be borne by this contractor.

3.05 ELECTRICAL WIRING AND CONNECTIONS

A. Installation of raceways, boxes, cabinets, wire and cable shall meet or exceed NEC, latest edition.

B. All cabling in mechanical rooms, down walls to thermostat boxes, and any exposed areas (i.e. gymnasiums, auditoriums, etc) shall be housed in conduit. Areas above concealed ceiling spaces without conduit on the cabling shall have wiring supported from structure above, Wire will not be allowed to lay free on the ceiling/space.

C. Provide electrical conduit seals to close off openings into the electrical boxes behind any thermostat or sensor. This shall include sealing the conduit after wiring installation. Contractor shall evaluate each box location and insulate the inside of the box if necessary.

D. All conduit installed as part of the temperature controls system shall be Blue in color.

E. Control wiring when installed above the ceiling shall be furnished with a plenum rated jacket. Wiring may be placed in cable tray where available.

F. Fasten flexible conductors, bridging cabinets and doors, neatly along hinge side; protect against abrasion. Tie and support conductors neatly.

G. Number-code or color-code conductors except local individual room controls, for future identification and servicing of control system.

H. Connect electrical components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

I. Connect manual reset limit controls independent of manual control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

J. Connect HAND-OFF-AUTO selector switches to override automatic interlock controls when switch is in HAND position.

3.06 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

B. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.

C. Provide basic operator training for four persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Included in the total training time listed below, 4-8 hours shall be dedicated to mapping and displaying Bacnet points for all applicable equipment in coordination with the owner. Include a minimum of 40 hours dedicated instructor time. Provide training on site.

3.07 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate complete and operating system to Owner.

B. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.

C. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

D. Provide operator training on data display, alarm and status descriptors, requesting data, execution of commands, and request of logs. Schedule training with Owner with at least 7 days' notice.

3.08 COMMISSIONING

A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to start control systems.

B. Test and adjust controls and safeties. Recalibrate all sensors where wiring lengths effect sensor readings.

C. Replace damaged or malfunctioning controls and equipment.

D. Start, test, and adjust control systems.

E. Demonstrate compliance with requirements.

F. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.

END OF SECTION

SECTION 23 21 13 - HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.

B. Heating water piping, above grade.

C. Pipe hangers and supports.

D. Unions, flanges, mechanical couplings, and dielectric connections.

1.02 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.

D. ASME B31.9 - Building Services Piping; 2020.

A. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.

C. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts; 2014 (Reapproved 2020).

D. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.

E. ASTM A536 - Standard Specification for Ductile Iron Castings; 2024.

F. ASTM B32 - Standard Specification for Solder Metal; 2020.

G. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications; 2018, with Editorial Revision (2024).

H. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.

I. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2024).

J. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

K. AWS D10.12M/D10.12 - Guide for Welding Mild Steel Pipe; 2000.

L. AWWA C606 - Grooved and Shouldered Joints; 2015.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.

N. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; 2012.

1.03 SUBMITTALS

A. See Devision 01 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.

C. Product Data:

1. Include data on pipe materials, pipe fittings, valves, and accessories.
2. Provide manufacturers catalog information.
3. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

D. Closeout Documents:

1. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum five years of experience.

C. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

D. Coupling Manufacturer:

1. Perform on-site training by factory-trained representative to the Contractor's field personnel in the proper use of grooving tools and installation of grooved joint products.
2. Periodic job site visits by factory-trained representative to ensure best practices in grooved joint installation.

E. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:

1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
2. Grooved mechanical joints may be used in indoor, accessible locations only.
    a. Accessible locations include those exposed on interior of building, above lay-in-tile ceilings, in mechanical rooms, and as approved by Engineer.
    b. Grooved mechanical connections and joints comply with AWWA C606.
        1) Ductile Iron: Comply with ASTM A536, Grade 65-45-12.
    c. Use rigid joints unless otherwise indicated.
    d. Depending on pipe size, three or four flexible joints may be used in lieu of a flexible connector. Consult with coupling manufacturer's installation instructions.
    e. Use gaskets of molded synthetic rubber with central cavity, pressure responsive configuration and complying with ASTM D2000, Grade 2CA615A15B44F17Z for circulating medium up to maximum 230 degrees F or Grade M3BA610A15B44Z for circulating medium up to maximum 200 degrees F.
    f. Provide steel coupling nuts and bolts complying with ASTM A183.
    g. Provide rigid couplings with shift limiting slant pad.
3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.

D. Valves: Provide valves where indicated:
1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with cap; pipe to nearest floor drain.
2. For throttling, bypass, or manual flow control services, use ball valves.
3. For shut-off and to isolate parts of systems or vertical risers, use ball valves.

E. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 HEATING WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D10.12M/D10.12 welded.
2. Threaded Joints: ASME B16.3, malleable iron fittings.

3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings with shift limiting slant pad.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:

1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
   a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
2. Copper press fittings shall be double pressed type and conform to the material and sizing requirements of ASME B16.51. O-rings for copper press fittings shall be EPDM.
   a. All O-rings shall be rated for 50% ethylene or propylene glycol with 210 degree water.
   b. Press fit installation shall be in accordance with the manufacturer's specifications contained in latest published literature.
   c. All press fit couplings, fittings and specialties shall be the products of a single manufacturer.
   d. Manufacturers:
      1) Viega
      2) Milwaukee
      3) Apollo
      4) Nibco

2.03 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58 and MSS SP-69.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 or MSS SP-69 recommendations, which ever is more stringent.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
5. Vertical Support: Steel riser clamp.
6. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
7. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated for unisulated copper pipe.
9. Hanger Rods: Zinc-plated steel, threaded both ends, threaded one end, or continuous threaded.

10. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
11. Hangers and strut located in corrosive areas shall be type 316 stainless steel with stainless steel hardware.
12. Hangers for all piping shall be oversized to encircle the piping and the insulation, the insulation shall be continuous through all hangers.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.04 UNIONS, FLANGES, AND MECHANICAL COUPLINGS

A. Unions for Pipe of 2 Inches and Less:
1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
1. Ferrous Piping: 150 psig forged steel, slip-on.
2. Copper Piping: Bronze.
3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket. Privide with shift limiting slant pad on mechanical coupling.
1. Dimensions and Testing: In accordance with AWWA C606.
2. Mechanical Couplings: Comply with ASTM F1476.
3. Housing Material: Ductile iron complying with ASTM A536.
4. Coupling gasket shall be EPDM molded synthetic rubber, per ASTM D-2000 suitable for temperature range from minus 30 degrees F to 250 degrees F.
5. Coupling bolts shall be track head type with hexagonal heavy nuts, per ASTM A-449 and A-183-60.
6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
7. Manufacturers:
   a. Victaulic Company: www.victaulic.com.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems. See Section 23 25 00 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install heating water piping to ASME B31.9 requirements.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interference with use of space.

E. Group piping whenever practical at common elevations.

F. Install firestopping to preserve fire resistance rating of partitions and other elements.

G. Slope piping and arrange to drain at low points.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

1. Flexible couplings may be used in header piping to accommodate thermal growth, thermal contraction in lieu of expansion loops.
2. Use flexible couplings in expansion loops.

I. Inserts:

1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

J. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

L. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

M. Use eccentric reducers to maintain top of pipe level.

N. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

O. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.

P. Install valves with stems upright or horizontal, not inverted.

3.03 TESTING

A. Hydronic Piping shall be tested hydrostatically in accordance with latest edition of ASTM B31.9 and the following:

1. Other than ground source heat pump loop systems:

a. Pressure: 1-1/2 times working pressure but not less than 100 psi.

b. Duration: 15 minutes

3.04 SCHEDULES

A. Space hangers so as to prevent sag and permit proper drainage. A hanger shall be placed within one foot of each horizontal elbow.

B. Hanger spacing to comply with all local code requirements.

END OF SECTION

SECTION 23 25 00 - HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.

1. System cleaner.
2. Closed system treatment (water).

B. Glycol

1.02 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
2. Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

C. Closeout Documents:

1. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
2. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
3. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
4. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
5. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. Sufficient chemicals for treatment and testing during required maintenance period.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. System Cleaner:

1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
2. Passivates steel surfaces
3. Non-corrosive to base metals
4. Cleaner to be similar to Nalco #2567

B. Closed System Treatment (Water):

1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
3. Conductivity enhancers; phosphates or phosphonates.

2.02 GLYCOL SOLUTION

A. Manufacturers

1. Dow Chemical model Dowtherm SR-1, or Kurita model 9132
2. If expanding existing system, match existing glycol product.

B. Type - Inhibited Ethylene

C. Glycol Solution:

1. Heating Hot Water: Inhibited glycol and water solution mixed 35 percent glycol - 65 percent water, suitable for operating temperatures from minus 30 degrees F to 210 degrees F.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.

D. Clean and flush glycol system before adding glycol solution. Refer to Section 23 25 00.

E. Feed glycol solution to system through make-up connection as indicated on drawings. Vent system at high points to remove air and assure system is full. Set initial fill pressure at 5 psi (adjustable) at high point of system.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide concrete housekeeping pad for floor mounted equipment and tanks.

3.03 INTRODUCTION OF GLYCOL SOLUTION

A. This contractor shall collect and test a sample from each vessel used to transport the glycol and/or solution to the project site. The analysis shall identify any potential issues related to the chemical treatment or introduction of glycol into the system. Analysis shall be performed by an independent certified laboratory.

B. The new heating coil piping circuit shall be filled with a 35% (35%-37%)solution by volume of Dowtherm SR-1 heat transfer fluid. The solution shall be thoroughly mixed before being pumped into the piping systems. After the introduction of the solution into the piping systems, the systems shall be tested to insure a burst protection temperature of -35°F.

C. It will be this contractor’s option to provide factory premixed R.O. solution or provide proper water treatment to attain R.O. quality for the final fluid.

D. All glycol shall have surfactants and dispersants included in the inhibitor package of the glycol.

E. Contractor shall provide documentation from an independent lab indicating levels of glycol concentration, amount of minerals, etc. as described below in the system after solution is filled, again after one month & finally one year after system has been put into operation. Contractor shall provide additional fill of solution & shall make adjustments to the system fluid as required to provide acceptable limits as described by the independent lab test. The contractor shall retest and make adjustments until all values are considered acceptable. Acceptable range for system fluids include:

1. Clarity shall be considered “clear”, (not cloudy).
2. Sediment shall have a wt% of <0.01.
3. Fluid shall have a PH level of 8-10.5.
4. Reserve alkalinity shall be >8 ml of 0.1N HCl.
5. Chloride levels shall be <100 ppm Cl.
6. Sulfate levels shall be <250 ppm SO4.
7. Total hardness shall be <200 ppm CaCO3.
8. Ferrous metal corrosion rate shall be <0.5 mils per year (mpy).
9. Copper corrosion rate shall be <0.2 mils per year (mpy).
10. Nitrite levels shall be <100 ppm NO2.
11. Nitrate levels shall be <100 ppm NO3.
12. Mercaptobenzothiazole levels shall be <100 ppm MBT.
13. Glycol in system shall be of the type specified and within 1% of the amount specified.

14. Glycols other than specified to be in system fluid shall be <1 % volume in the system.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ducts.

B. Flexible ducts.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

D. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide data for duct materials.

C. Closeout Documents:

1. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate per appropriate seal class, following SMACNA (LEAK).
2. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.05 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.

B. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 33 19.

C. Duct Material in accordance with Allowed Static Pressure Range:

1. Medium Pressure Supply (from supply fan to VAV inlet): 4 in-wc, galvanized steel
2. Low Pressure Supply (from VAV outlet to air outlet): 2 in-wc, galvanized steel
3. Return and Relief: 2 in-wc, galvanized steel

D. Duct Sealing and Leakage in accordance with Static Pressure Class:

1. As indicated above for duct material pressure class.

E. Duct Fabrication Requirements:

1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
2. Ductwork shall be fabricated of minimum 26 gauge galvanized metal.
3. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
4. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
5. Construct tee's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal wi. Short radius elbows (1 times duct width) shall be allowed if a single radius turning vane is installed at 1/3 width-distance from the inner radius.
6. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated or required.
7. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
8. Provide transitions in duct size from trunk or runout ducts shown on the drawings to the inlet dimensions of any device connected to the duct. Transitions shall be sealed air tight.
9. Water tight drip pans shall be provided below all power vent, relief vent, gravity vent, fresh air and exhaust openings through roof, either built into the ductwork or, if no duct is installed, independently suspended below opening.

2.02 METAL DUCTS

A. Material Requirements:

1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.03 JOINT SEALERS AND SEALANTS

A. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts. Sealant shall be gray in color or a color matching the duct system on which it is applied.
2. All joints of low-pressure duct shall be carefully sealed to eliminate air leakage. Sealer shall be spread on the inside of all slips and longitudinal joints and then the duct assembled. Sealer shall be applied to all screw heads, connecting laps, and corner joints as well as all joints of flexible duct. Sealer shall be suitable for indoor/outdoor HVAC duct systems and shall be applied in accordance with manufacturer's recommendations. Duct sealants shall be U.L. Classified with a flame spread rating of 25 or less and a smoke developed rating of 50 or less. Sealants shall be UL 181B-M listed and have a service range of -20 degrees F to 200 degrees F
3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
4. Manufacturers:
    a. Carlisle HVAC Products; Hardcast Iron-Grip 601 Water Based Duct Sealant: www.carlislehvac.com/sle.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 FLEXIBLE DUCTS

A. Flexible Ducts: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound spring steel wire.
1. Flexible duct shall meet NFPA 90A and 90B requirements and be UL listed 181 Class 1 Air Duct with a flame spread less than 25 and smoke developed less than 50.
2. Insulation: Fiberglass R-6.0 insulation with polyethylene vapor barrier film.
3. Maximum Velocity: 6000 fpm.
4. Temperature Range: Minus 20 degrees F to 210 degrees F.
5. Flex duct shall only be used in locations explicitly indicated on the drawings (generally limited supply air device connections and limited to 5 foot length without change in direction).
6. Flex duct shall not be used above inaccessible ceilings.
7. No flexible "duct connectors" shall be allowed.
8. Manufacturers:
    a. Wiremold.
    b. Thermaflex.
    c. Flexmaster.
    d. Atco.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. All branch takeoffs shall be made using high efficiency type takeoff fittings similar to Sheet Metal Connectors Super HETO. All takeoffs shall be provided with a manual volume damper.

C. Install products following the manufacturer's instructions.

D. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.

E. Flexible Ducts: Connect to metal ducts with duct sealer on inside and outside of flex duct as well as strap clamp around duct end. Tape outer jacket to diffuser neck..

F. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Use double nuts and lock washers on threaded rod supports.

I. Provide galvanized iron drip pans under water, soil, waste, drain or heating system piping which runs over electric switchboards, elevator controllers, or electric motor starters. Drip pans shall have all joints and seams soldered water tight. Each drip pan shall have a drain piped to discharge where shown on the drawings, or if not shown, to discharge over nearest available drain.

J. Sealing of Ductwork:

1. Joints of all supply, return and exhaust ducts shall be carefully sealed to eliminate air leakage. Sealer shall be spread on the inside of all slips and longitudinal joints and then duct assembled. Sealer shall also be applied to exterior to all joints. Sealant shall be UL 181B-M listed and have a service range of -20 degrees F to 200 degrees F.
2. Seal all ductwork to seal class A. This will require all ductwork to have all joints, seams and wall penetrations sealed. Sealing must be sufficient to achieve a leakage class 6. This means that 6 CFM of leakage per 100 sq ft of duct surface is the maximum allowable threshold if tested at 1 inch test pressure. See additional duct sealing requirements in the latest edition of the SMACNA manual “HVAC Air Duct Leakage Test Manual.”
3. If review of the testing and balancing report reveals duct leakage in excess of the leakage class 6, the contractor shall be required to seal the ductwork in place. Duct sealing shall be as follows:
    a. Repair all major leakage sites (> ½ inch across) using mastic and fiberglass mesh tape.
    b. Assure the structural integrity of all mechanical joints of existing ductwork using mastic and fiberglass mesh tape.

c. Seal existing ductwork from the inside using automated, UL Certified, aerosolized sealant injection as manufactured by Aeroseal

d. Protect air-moving equipment, air inlets and outlets, and other devices and appurtenances as recommended by the manufacturer.

e. Protect occupied spaces from aerosol particles using manufacturer procedures.

f. Provide pre-sealing, post-sealing and sealing profile certificates for all sections sealed.

g. Seal all injection and test holes in existing ductwork using patching plates sealed with mastic.

h. Any insulation (internal or external) shall be replaced on the patching plate.

4. Sealant shall be applied neatly. Satisfactory appearance shall be maintained on all exposed ductwork.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct access doors.

B. Duct test holes.

C. Volume control dampers.

D. Miscellaneous Products:

1. Internal strut end plugs.
2. Duct opening closure film.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
2. Indicate for shop fabricated assemblies including volume control dampers.

C. Closeout Documents:

1. Project Record Drawings: Record actual locations of access doors and test holes.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

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

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 DUCT ACCESS DOORS

A. Manufacturers:

1. Nailor Industries, Inc: www.nailor.com.
2. Ruskin Company, a brand of Johnson Controls: www.ruskin.com.
3. Cesco Advanced: www.cescoproducts.com

4. Kees: www.kees.com
5. National Controlled Air: www.ncamfg.com
6. Vent Products: www.ventproducts.com
7. Aire Technologies:www.airetechnologies.com

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Provide access doors with framed edges, equipped with latches in ductwork for inspection of all automatic operated dampers, etc.

D. Access doors for round ducts shall be rectangular and shall be constructed in accordance with SMACNA HVAC Duct Construction Standards (latest edition). Access door dimensions shall not be less than 2" smaller than duct diameter. The door shall be provided with a handle and retaining ring. Access doors shall be equal to Ductmate, Model FD1 (rectangular door).

E. Access doors for rectangular ducts shall be similar to Air Balance Model FSA 101 and constructed of 24 gauge galvanized steel with a 1" thick insulated door, frame and double cam latches. Frame shall be gasketed to minimize air leakage.

F. Access doors for fire dampers, smoke dampers and fire/smoke dampers shall be a minimum of 12”x 12” in size. Increase duct size as required for access door installation.

G. All duct access doors shall be accessible through walls, ceilings or floors. Provide access doors as required to reach duct access doors.

H. Access doors with sheet metal screw fasteners are not acceptable.

2.02 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

1. Manufacturers:
   a. Carlisle HVAC Products; Dynair Test Port with Red Cap with O-Ring Seal: www.carlislehvac.com/#sle.

2.03 VOLUME CONTROL DAMPERS

A. Manufacturers:

1. Nailor Industries, Inc: www.nailor.com.
2. Pottorff: www.pottorff.com/#sle.
3. Ruskin Company, a brand of Johnson Controls: www.ruskin.com.
4. Aire Technologies: www.airetechnologies.com

5. Greenheck: www.greenheck.com

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Each register and diffuser air terminal shall be provided with a damper in the duct leading to the air terminal. Each branch duct leading to a group of two or more air terminals shall be provided with a damper at the point where the branch leaves the main duct. Dampers shall be installed with a maximum of 1/8" clearance all around. Dampers shall be installed so that they can be adjusted at any time after completion of the work, and shall be fitted with "Parker", or equal, damper quadrants. Quadrants shall be plainly marked to indicate position of damper. All dampers shall be tight fitting and be reinforced to prevent vibration. Damper handles shall be extended type for insulation clearance.

D. Where damper shafts penetrate duct walls, the openings shall be properly sealed to eliminate air leakage.

E. Each damper handle, where located above a lay-in tile ceiling, shall be identified by attaching section of flagging tape to the end of the damper handle. Length of flagging tape shall be approximately 12" long with longer or shorter lengths determined based on location of installation and clearance requirements. The flagging tape shall be high visibility, similar to pink or orange, to allow for ease of locating damper locations.

F. Where dampers are located in ducts concealed above non-accessible ceiling, the dampers shall be equipped with Ventlock concealed, flush cap regulators.

G. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

1. Manufacturers:

a. Carlisle HVAC Products; Dynair End Bearing Leak Resistant Sets: www.carlislehvac.com/#sle.

b. Elgen Manufacturing Company, Inc; Snap-In Bushing: www.elgenmfg.com/#sle.

H. Quadrants:

1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

3. Where rod lengths exceed 30 inches provide regulator at both ends.

4. Manufacturers:

a. Carlisle HVAC Products; Dynair Double Shear Rattle Free Quadrants 1/2 inch: www.carlislehvac.com/#sle.

2.04 MISCELLANEOUS PRODUCTS

A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.

1. Manufacturers:

a. Carlisle HVAC Products; Dynair Internal Duct Reinforcement - Conduplugs: www.carlislehvac.com/#sle.

B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.

1. Thickness: 2 mils.
2. High tack water based adhesive.
3. UV stable light blue color.
4. Elongation Before Break: 325 percent, minimum.
5. Manufacturers:
   a. Carlisle HVAC Products; Dynair Duct Protection Film: www.carlislehvac.com/#sle.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 31 00 for duct construction and pressure class.

B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, before turning vanes on duct mains, and elsewhere as indicated. Provide minimum 12 by 12 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

C. Provide duct test holes where indicated and required for testing and balancing purposes.

D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off.

E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

F. Provide balancing dampers on all takeoffs serving terminal devices.

END OF SECTION

SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single-duct terminal units.

1.02 REFERENCE STANDARDS

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addenda (2011).

B. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).

C. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units; 2025.

D. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2019).

E. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope; 2019.

F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2025.

G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2024.

I. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
2. Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
    a. Include schedules listing discharge and radiated sound power level for each of the second through sixth-octave bands at inlet static pressures of 1 to 4 in-wc.
3. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.

C. Closeout Documents:

1. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
2. Project Record Documents: Record actual locations of units and locations of access doors required for access of valving.
3. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.

4. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
5. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.05 WARRANTY

A. Provide 18-month manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS

A. Manufacturers:

1. Price Industries, Inc: www.priceindustries.com.
2. Trane, a brand of Ingersoll Rand: www.trane.com.
3. Titus: www.titus-hvac.com
4. Enviro-tec: www.enviro-tec.com
5. Nailor Industries Inc[<>]: www.nailor.com.

B. General:

1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
3. Units shall deliver the maximum scheduled cfm with an air pressure drop not to exceed 0.35", including all accessories listed below.

C. Unit Casing:

1. Minimum 22 gauge, 0.0299 inch galvanized steel.
2. Air Inlet Collar: Provide round, suitable for standard duct sizes.
3. Unit Discharge: Rectangular, with slip-and-drive connections.
4. Provide control cabinet enclosure mounted to VAV box. Control Cabinet access door shall match construction of VAV box.
5. Acceptable Liners:

a. 3/4" thick, 1-½ pcf aluminum foil insulation, meeting NPFA 90 A and UL 181. All terminal coil casings shall be constructed and insulated to the same standard as the VAV box.

b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.

D. Damper Assembly:

1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.

2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.

3. Incorporate low leak damper blades for tight airflow shutoff.

a. Air Leakage Past Closed Damper: Maximum two percent of unit maximum airflow at 3 in-wc inlet static pressure, tested in accordance with ASHRAE Std 130.

E. Hot Water Heating Coil:

1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.

a. Access Door: Gasketed, cam-lock latches, and insulated located on bottom.

b. Right or left coil inlets. Coordinate prior to ordering.

2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.

3. Coil leak tested to minimum 350 psig.

4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.

F. Controls:

1. DDC (Direct-Digital Controls):

a. See Section 23 09 23. Controls for VAV box shall be furnished by the temperature controls contractor for field mounting,

2. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.

a. Signal accuracy: Plus/minus five percent throughout terminal operating range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are suitable for installation.

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. See drawings for the size(s) and duct location(s) of the air terminal units.

D. Provide ceiling access doors or locate units above easily removable ceiling components.

E. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.

F. Do not support from ductwork.

G. Connect to ductwork in accordance with Section 23 31 00.

3.03 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow.

3.04 CLEANING

A. Vacuum clean coils and inside of units.

B. Install new filters.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Registers/grilles

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.

1.03 SUBMITTALS

A. See Division 01 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

C. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC, Division of Air System Components: www.krueger-hvac.com.

B. Price Industries: www.price-hvac.com/#sle.

C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com.

D. Tuttle and Bailey: www.tuttleandbailey.com/#sle.

E. Nailor: www.nailor.com

2.02 REFER TO DRAWINGS AND SCHEDULES FOR REQUIRED DIFFUSERS, GRILLES, AND REGISTERS.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

END OF SECTION

SECTION 26 00 03 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements and Standards specifically applicable to the following work required to complete the project:

1. Electrical Systems Work.
2. Communications Systems Work.
3. Electronic Safety and Security Systems Work.

B. This section describes the functional performance criteria that the completed Work shall include/provide.

1.02 RELATED SECTIONS

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

B. This section is directly related to all other specifications of the project manual including Division 01 - General Requirements.

C. See project manual for description of Alternate Bids and related Work.

1.03 SCOPE OF WORK

A. Work includes providing all labor, and materials necessary for satisfactory completion of all work shown on or required by all Drawings and in all specifications. In general, this consists of the following:

1. Providing all demolition of existing equipment required to perform the work shown on or required by all Drawings.
2. Low Voltage Power Distribution.
3. Wiring devices.
4. Communications Systems.
5. Electronic Safety and Security Systems.
6. Other systems specified, indicated, or shown.

B. Contractor shall visit site, prior to submitting his bid, to familiarize himself with all existing systems and conditions. This includes measurements for lengths, quantities, clearances and all other field verifiable conditions. No extra charges will be allowed because of failure of Contractor to become familiar with all existing conditions.

1.04 GENERAL REQUIREMENTS

A. All specifications, corresponding Drawings and all addenda form a complete set of documents for Work for this project, and no part shall be considered complete without the other.

B. Contractor shall obtain all required licenses, permits, plan reviews, inspections and pay all fees, costs and all other charges for this project.

C. All sales, use and any other taxes shall be paid by Contractor.

D. Contractor shall comply with all ordinances, laws, regulations and codes applicable to the work involved including ANSI/NFPA 70, Latest Edition. If, in any instance, the plans and specifications conflict with such laws, the law shall take preference. This does not relieve the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to same.

E. If Contractor is aware of conflicts between drawings or specifications and such codes or regulations, they shall be brought to the Architect or Engineer's attention prior to commencing work. If Contractor performs work in violation of such codes or regulations, whether such violation is shown or specified or not, Contractor shall correct the violation at his expense.

F. Any work not clear to Contractor shall be referred to Architect or Engineer for clarification before bid is submitted. If no question is raised prior to opening of bid, Contractor shall be required to provide work, in question, as directed by Architect or Engineer, whose decision shall be final, without additional charges.

G. By virtue of submitting a bid, Contractor agrees that he is skilled and experienced in use of and in interpretation of drawings and specifications. Contractor further agrees that he has carefully reviewed all drawings, all specifications and all addenda, which constitute bid documents for this contract, and finds them free of ambiguities and good and sufficient for bidding and construction purposes.

1.05 REGULATORY REQUIREMENTS

A. A partial list of governing codes (latest edition) in addition to ANSI/NFPA 70 are:

1. State and Local Electric Codes.
2. International Building Code (IBC).
3. State Building Code.
4. International Fire Code. (IBC).
5. State Fire Codes.
6. State Health Department Requirements.
7. Serving Utility Regulations.
8. National Fire Protection Association (NFPA) National Fire Codes.
    a. NFPA 70 - National Electrical Code.
    b. NFPA 72 - National Fire Alarm and Signaling Code.
    c. NFPA 101 - Life Safety Code.
9. Williams-Steiger (OSHA) Regulations.
10. Americans with Disabilities Act (ADA) requirements.

1.06 INSTALLATION REQUIREMENTS AND STANDARDS

A. Description of Conductor Installation Requirements

1. Conductor and conduit sizes noted on Drawings are based on type THHN copper unless noted otherwise.

2. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
    a. Use stranded conductors for control circuits.
    b. Use conductor not smaller than 12 AWG for power and lighting circuits.
    c. Use conductor not smaller than 16 AWG for control circuits.
    d. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 60 feet.
    e. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 145 feet.

B. Wiring Methods
1. Motor Feeders: Type THHN-THWN or XHHW-2 single conductors in raceway.
2. Branch Circuits:
    a. Multi-wire branch circuits shall not be acceptable. Provide dedicated neutral conductor for each circuit.
    b. Home Runs (from circuit breaker to junction box at accessible location adjacent to first wiring device): Type THHN-THWN single conductors in raceway.
    c. Exposed (including in crawl spaces, electrical rooms, mechanical rooms, and above accessible ceilings): Type THHN-THWN single conductors in raceway.
    d. Concealed (e.g. in ceilings, walls, partitions): Type THHN-THWN single conductors in raceway.
3. Class 2 Control Circuits:
    a. For lighting control devices (occupancy sensors, low-voltage switches, etc.), exposed multi-conductor cable, plenum rated shall be acceptable in concealed locations. Install cabling in accordance with section 27 0528.
    b. Unless otherwise noted all other locations use type THHN-THWN single conductors in raceway.

C. Description of Power Raceway Installation Requirements
1. Conduit sizes noted on Drawings are based on type THHN copper unless noted otherwise.
2. Conduit in soil:
    a. Use Schedule 40 or 80 PVC, tape wrapped IMC, PRMC, tape wrapped RMC.
    b. Transition from below grade to above grade: unless noted otherwise use IMC, PRMC, or tape wrapped RMC.
    c. Transition through basement or foundation wall: unless noted otherwise use PRMC, Schedule 80 PVC, tape wrapped IMC, or tape wrapped RMC conduit to at least 5 feet from wall.
    d. Any below grade branch circuit conduits to patient care areas must be metallic, not PVC.
3. Conduit at exterior locations above grade:
    a. EMT with watertight fittings is acceptable.
    b. Nonmetallic conduit is not acceptable.

4. Conduit at slab on grade and slab below grade located within slab:
    a. Use Schedule 40 PVC, tape wrapped IMC, PRMC, or RMC.
    b. Where stub up occurs, tape wrapped IMC, PRMC, or RMC.
5. Conduit in slab above grade:
    a. Maximum Size Conduit in Slab: ¾ inch. Verify larger sizes with structural engineer.
    b. Use RMC, IMC, EMT, or Schedule 40 PVC. Stubs shall be IMC, RMC, or EMT.
6. Conduit at interior locations:
    a. Concealed within stud walls: Use EMT, or flexible steel conduit (FMC). Limit lengths of FMC concealed within walls to 6' or less.
    b. Concealed above accessible ceilings: Use EMT.
        1) For connections to devices mounted within the accessible ceiling system or mounted to the ceiling tiles: use FMC in lengths no greater than 6' unless noted otherwise.
        2) Concealed above non-accessible ceilings: Use EMT.
        3) Exposed locations not subject to physical damage: Use IMC, RAC, RMC, EMT, and surface metal raceways (where approved or indicated).
        4) Exposed locations subject to physical damage use IMC or RMC.
        5) Subject to physical damage: Use IMC or RMC.
7. Electric nonmetallic tubing (ENT) and flexible nonmetallic conduit are not acceptable except where specifically noted on drawings or other sections of the specification.

D. The following industry standards shall apply as minimum requirements.
1. NEMA and ANSI Standards.
2. BICSI standards.
3. EIA / TIA Standards.
4. Underwriters Laboratories Standards (UL).
5. National Electrical Contractors Association (NECA) Standards. The following is a partial list of applicable NECA Standards:
    a. NECA 1 - Standard for Good Workmanship in Electrical Construction.
    b. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT).
    c. NECA 500 - Standard for Installing Indoor Commercial Lighting Systems.
    d. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling.

1.07 SUBSTITUTIONS

A. Where substitute materials or prior approved materials are provided, Contractor shall assume all responsibility and pay for all necessary changes resulting from such substitution. This responsibility shall also include any extra costs required by other trades.

B. Prior approved substitutions:

1. Required where specifically noted or where materials are specifically identified by a manufacturer's name, model or catalog number. In these cases only such material may be included in base bid.
2. If Contractor desires to furnish materials other than that named, Contractor or supplier shall apply in writing, to Engineer, for prior approval of such material at least ten (10) days prior to bid opening date.
3. Requests for prior approved substitution shall indicate specific proposed materials in lieu of those specified together with complete technical data for all such proposed material.
4. All prior approved substitutions will be clearly identified in addenda which will be sent to all bidders well in advance of bid opening. Only material listed on drawings, specifications and addenda shall be provided.

C. Substitutions after execution of contract: Substitution of materials other than those specifically named in contract documents will be approved, by Engineer, for following reason only:

1. That material proposed for substitution is equal to or superior, in Engineer's opinion, to that specified in construction, efficiency, appearance, and utility.
2. That material named in the documents cannot be delivered to project in time to complete work due to conditions beyond control of Contractor.

D. Equal To and Or Equal: Where materials are specifically identified as “equal to” an identified manufacturer’s name, model, or catalogue numbers or where noted as “or equal” manufacturer’s complying with the requirements of these specifications not listed may be incorporated in the Work. Such materials must be equal to or superior, in Engineer’s opinion, to that specified in construction, efficiency, appearance, and utility.

1.08 COORDINATION

A. Sequence and coordinate work with other trades so as to avoid conflict of space and time sequence. Installation of materials shall be coordinated with other trades and installed at such time and manner as to not delay or interfere with the work of other trades. If interference develops, the matter shall be brought to the attention of the Architect for decision. Organize the work so that progress of work will conform to the progress of other trades. Complete the entire installation as soon as building conditions permit.

B. This Contractor shall be held solely responsible for coordinating proper size and location of hangers, slots, chases, openings, etc., required for proper installation of his work and shall arrange with the proper building contractors for inserts, chases, and openings.

C. Refer to drawings and specifications of all other divisions and trades for correlating information, location and details of work, dimensions, etc. Coordinate location of all outlets and equipment. If conflicts develop Architect's decision will govern. No additional compensation will be allowed for moving of un-coordinated, misplaced or poorly located outlets, material, equipment or work

D. Personally, or through an authorized and competent representative, constantly supervise work from beginning through completion and final acceptance. So far as possible contractor shall keep same foreman and workmen throughout project duration. Keep enough workmen on job to insure keeping up with or ahead of other trades so that no delays occur.

E. During its progress, the work shall be subject to observation by representatives of Owner, and Architect at which times Contractor shall furnish all required information and cooperation

1.09 SUBMITTALS FOR REVIEW

A. Provide Submittals for Review for the following equipment, components, and / or systems:

1. Luminaires.
2. Communications Horizontal Cabling.
3. Fire Alarm System.

B. Within 30 days after award of Contract the Contractor shall submit for acceptance minimum of six (6) copies for the equipment or systems requested.

C. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal.

D. Submittal shall include:

1. At the front of the submittal on dedicated page(s): Any deviation from contract requirements shall be called to attention. No deviation will be permitted without written approval of Architect or Engineer.
2. At the front of the submittal on dedicated page(s): Any requests for clarification, selections that must be made, etc. shall be called to attention.
3. Drawings and brochures shall be clearly marked as to item to be supplied and shall have designation corresponding to designation on Drawings (for example: enclosed switch data shall indicate for which equipment they are provided).
4. Manufacturer's name and address.
5. Catalog designation or model number.
6. Manufacturer’s product data for each component (e.g. submittal of luminaires shall include both lamp and ballast information).
7. Catalog sheets showing ratings, settings,performance curves and rated capacities.
8. Dimensions, knockout sizes and locations, materials, fabrication details, finishes.

9. Outline and support point dimensions, voltage, ampacity, integrated short circuit ampere rating, arrangement and sizes, and accessories

E. Engineer will review the submitted drawings with reasonable promptness, and return same to Contractor. No equipment should be released for shipment until drawings and brochures have been approved by Engineer.

F. Review of shop drawings and brochures shall not permit departures from contract documents or relieve Contractor of responsibility for error in detail, dimension, quantity or otherwise that may exist, or as approving departures from additional details or instructions previously furnished.

1.10 SUBMITTALS FOR CLOSEOUT

A. As Built Drawings:

1. The contractor shall maintain one set of drawings at the job site to be used as a master copy. All changes and deviations shall be clearly marked and noted by colored pencil. These drawings shall be turned over to the Engineer upon project completion.
2. Indicate specific locations and sizes of all equipment, conduit and cabling installed as part of Work.
3. Provide all Certificates of Compliance indicating appropriate installation of all materials by authority having jurisdiction as described herein under separate tab in Operation and Maintenance Manuals labeled “Certificates of Compliance”.

B. Operations and Maintenance Manual:

1. Bind operations and maintenance manual for electrical system in a hard-back binder. Front cover of each binder shall include title of manual, project name, project location, and date of completion. Provide a duplicate electronic copy of the manual in pdf format with searchable text, grouped and bookmarked per the below description.
2. Provide a master index at the beginning of manual indicating items included.
3. First section shall consist of name, address, and phone number of Architect, Electrical Engineer, Contractor, and all associated Subcontractors. Also include a complete list of equipment used with name, address, and phone number of vendor.
4. Provide a section for the following information with tabs, dividers, or other means of separating each different component within the system as well as separating each item or system from the next:
    a. Luminaires (including lamp and ballast information).
    b. Communications Systems (e.g. equipment room fittings, cabling, accessories).
    c. Fire alarm and detection system.
    d. Certificates of Compliance.
    e. Testing Reports. Include testing reports indicating results of tests and other information required by these specifications.

f. Summary list of equipment requiring lubrication indicating name of equipment, location and type and frequency of lubrication

5. Turn over to owner all supplied manufacturer's warranty documentation under a separate tab in the Operation and Maintenance Manuals labeled "Warranties".

6. Turn over to owner and obtain signed receipt for all maintenance materials, spare parts, touched up parts and loose items.

1.11 PROJECT SUBCONTRACTOR AND VALUES LISTING

A. Within five (5) days after contract execution date Contractor shall submit, to Architect, a list indicating brands of all major materials, names of all of his subcontractors and a schedule of values for this project. Architect reserves right to reject any material or subcontractor and question scheduled values.

PART 2 PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

A. Materials shall be standard products of manufacturer's regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design.

B. When two or more items of same material or equipment are required they shall be of the same manufacturer.

C. Materials and Finishes: Provide adequate corrosion resistance to eliminate staining of exposed surfaces.

2.02 CONDUCTORS AND CABLES

A. Manufacturers:

1. Alflex Corp. (Southwire)
2. American Insulated Wire Corp.
3. American Wire Group
4. Cerrowire
5. Coleman Cable, Inc.
6. Encore Wire, Ltd.
7. Essex Cable Company
8. Service Wire Co.
9. Substitutions under provision of Division 01 and Section - Electrical General Requirements.

B. Copper conductors (THHN/THWN):

1. Comply with NEMA WC 70, NFPA 70, and UL 83 or UL 44, UL 1063, UL 1581.
2. Type THHN cable shall meet all applicable ASTM standards
3. Type THHN cable shall meet Federal Specification A-A-59544.
4. UL listed sunlight resistant in black sizes 2AWG and larger. Sizes 1/0 and larger listed for CT USE. Sizes 14 through 1 AWG shall be rated VW-1. Sizes 8 AWG and larger shall be rated THWN-2.

5. Sizes 14 AWG and 12 AWG shall be solid and 10 AWG may be either solid or stranded, 8 AWG and larger are stranded.
6. Conductor shall be soft annealed copper.
7. Insulation shall be high-heat and moisture resistant PVC.
8. Jacket shall be abrasion, moisture, gasoline and oil resistant or listed equivalent.
9. Self-lubricating Jacket: Jackets on conductors sizes 2 and larger shall be Southwire "SIMpull" or equivalent with integrated self-lubrication.

2.03 CONNECTORS AND SPLICES

A. Manufacturers:
1. AFC Cable Systems Inc.
2. AMP
3. 3M
4. Burndy
5. Ideal Industrial Inc.
6. Ilsco
7. Kearney
8. Panduit
9. Tyco Electronics Corp.
10. Substitutions under provision of Division 01 and Section - Electrical General Requirements.

B. Factory fabricated connectors and splices of size, ampacity rating, material type, and class for application and service indicated.

C. Connections for Conductors:
1. Mechanical Screw Type Connectors:
a. Connectors shall be dual rated (AL7CU or AL9CU) and Listed by UL for use with aluminum and copper conductors and sized to accept aluminum conductors of the ampacity specified. Connectors shall be Burndy Unitap, Ilsco NIMBUS4FLEX, or approved equal.
2. Mechanical Compression Type Connectors:
a. Connectors shall be dual rated (AL7CU or AL9CU) and Listed by UL for use with aluminum and copper conductors and sized to accept aluminum conductors of the ampacity specified.
b. The lugs shall be marked with wire size, die index, number and location of crimps and shall be suitably color-coded. Lug barrel shall be factory prefilled with a joint compound Listed by UL.
3. Termination of Conductor to Aluminum Bus:
a. Hardware:

1) Bolts: Anodized alloy 2024-T4 and conforming to ANSI B18.2.1 and to ASTM B211 or B221 chemical and mechanical property limits.
2) Nuts: Aluminum alloy 6061-T6 or 6262-T9 and conforming to ANSI B18.2.2.
3) Washers: Flat aluminum alloy 2024-T4, Type A plain, standard wide series conforming to ANSI B27.2.

4. Termination of Conductor to Copper Bus:
   a. Hardware:
      1) Bolts: Plated or galvanized medium carbon steel; heat treated, quenched and tempered equal to ASTM A-325 or SAE grade 5.
      2) Nuts: Heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B.
      3) Washers: Should be steel, Type A plain standard wide series conforming to ANSI B27.2.
      4) Belleville conical spring washers: Shall be of hardened steel, cadmium plated or silicone bronze.

2.04 CONDUIT AND TUBING

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but not limited to those listed herein.

B. Minimum Size for all conduit materials shall be 1/2 inch unless otherwise required, indicated or specified. Minimum home run size for branch circuits shall be 3/4 inch.

C. Flexible Metal Conduit (FMC):
   1. Manufacturers:
      a. AFC Cable Systems, Inc.
      b. Electriflex Co.
      c. Or equal.
   2. Description: NFPA 70, type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1.
      a. Interlocked steel construction.
      b. If used as part of fire stop system FMC must be listed for applicable installation.
   3. Metallic Fittings and Conduit Bodies:
      a. Manufacturers:
         1) Bridgeport Fittings Inc.
         2) O-Z/Gedney
         3) Thomas & Betts Corporation.

4) Manufactured in accordance with ANSI/NEMA FB 1; listed and labeled as complying with UL 514B.

5) Material: Steel. Do not use cast zinc fittings.

D. Liquidtight Flexible Metal Conduit (LFMC):

1. Manufacturers:
   a. AFC Cable Systems, Inc.
   b. Electriflex Co.
   c. Or equal.
2. Description: NFPA 70, LFMC PVC jacketed steel FMC listed and labeled as complying with UL 360.
   a. Interlocked steel construction with PVC jacket.
3. Metallic Fittings and Conduit Bodies:
   a. Manufacturers:
      1) Bridgeport Fittings Inc.
      2) O-Z/Gedney
      3) Thomas & Betts Corporation.
      4) Comply with ANSI/NEMA FB 1; listed and labeled as complying with UL 514B.
      5) Material: Steel. Do not use cast zinc fittings.
      6) Rain tight compression ring with Insulated throat.

E. Electrical Metallic Tubing (EMT):

1. Manufacturers:
   a. Allied Tube and Conduit
   b. Republic Conduit.
   c. Wheatland Tube Co.
   d. Or equal.
2. Description: NFPA 70, type EMT steel electrical metallic tubing manufactured in accordance with ANSI C80.3 listed; labeled as complying with UL 797.
3. Metallic Fittings and Conduit Bodies:
   a. Manufacturers:
      1) Bridgeport Fittings Inc.
      2) O-Z/Gedney
      3) Thomas & Betts Corporation.
      4) Manufactured in accordance with ANSI/NEMA FB 1; listed and labeled as complying with UL 514B.

5) Material: Steel. Do not use cast zinc fittings.

6) Use set-screw or compression connectors and couplings. Do not use indenter type.

7) Where permitted for use in wet or damp locations use fittings listed for use in wet locations.

8) Embedded with Concrete: use “concrete tight” listed fitttings.

F. Rigid Polyvinyl Chloride (PVC) conduit:

1. Manufacturers:

a. Cantex.

b. Carlon.

c. Or equal.

2. Description: NFPA 70, type PVC rigid polyvinyl chloride conduit manufactured in accordance with NEMA TC-2 listed and labeled as complying with UL 651.

a. Schedule 80 where subject to physical damage.

b. Schedule 40 unless noted otherwise.

3. Fittings and Conduit Bodies:

a. Comply with NEMA TC-3; listed and labeled as complying with UL 651.

2.05 OUTLET BOXES

A. Manufacturers

1. Appelton Electric.

2. Crouse-Hinds.

3. O-Z/Gedney.

4. Square D. Co.

5. Steel City.

6. Thomas & Betts.

7. Wiremold Co.

8. Raco Co.

B. Sheet Metal Outlet Boxes: manufactured in accordance with NEMA OS 1; listed and labeled as complying with UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight; include ½ inch male fixture studs where required.

E. Gangable boxes are prohibited, unless specifically noted otherwise.

F. Nonmetallic Outlet Boxes: are not acceptable.

G. Cast Boxes: NEMA FB 1, Type FD, and FS..

2.06 WIRING DEVICES

A. Except as noted, all wiring devices shall be heavy duty type, exposed color shall match existing adjacent devices or be selected by Engineer or Architect unless indicated otherwise.

B. Receptacles connected to the essential branches of power (life safety, critical, or equipment branches), shall be Red in color.

C. Manufactured by: Bryant, Cooper Wiring Devices, Eagle Electric Mfg. Co., Inc., Hubbell Inc, Leviton, or Pass and Seymour.

D. Snap switches shall be 120/277 volt, 20-Ampere.

E. Receptacles shall be NEMA 5-20R, 125 volt, 20-Ampere.

F. Provide GFCI receptacles where indicated.

G. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.

1. Provide hospital grade for all new devices on this project.

H. Wall Plates:

1. Unbreakable reinforced (stiffened) plastic with smooth face and rounded edges with steel screws of matching color.
2. Color shall match device color.

2.07 NAMEPLATES AND SELF ADHESIVE LABELS

A. Self Adhesive Labels: Pressure sensitive adhesive back, rated for harsh environment.

1. 1/2" clear label with black standard block type text.
2. 1/4" clear label with 1/8" black standard block type text.

2.08 LUMINAIRES

A. Provide luminaires as scheduled on Drawings.

B. See light fixture schedule/specification on drawings.

C. Warranty:

1. Warranty for LED Drivers: 5 years from date of manufacture against defects in material or workmanship, for operation at a maximum case temperature of 70C.
2. Warranty for LED fixtures / modules: 5 years from the date of manufacture.

D. Maintenance Service

1. Replace or repair any luminaires that have failed or malfunctioned at Substantial Completion and for a period of one year after substantial completion.

E. Provide factory installed disconnect device on all fixtures.

F. Where painted finishes are indicated or required for luminaires and lighting fixtures; paint shall be applied to parts after fabrication and prior to assembly. Painting process shall include coverage of all surfaces including edges and corners. In general, prepainted metals are not acceptable for lighting fixture assemblies, parts or units.

G. Provide factory installed disconnect device on all fixtures.

H. Where painted finishes are indicated or required for luminaires and lighting fixtures; paint shall be applied to parts after fabrication and prior to assembly. Painting process shall include coverage of all surfaces including edges and corners. In general, prepainted metals are not acceptable for lighting fixture assemblies, parts or units.

I. LED Luminaires

1. Photometric measurements indicated on product data shall be provided in accordance with IESNA LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products and shall meet the requirements specified and / or indicated on the Drawings.
2. Lumen data indicated on product data sheets shall be generated in accordance with IESNA LM-80-08 IES Approved Method for Measuring Lumen Maintenance of LED Light Sources and shall meet the requirements specified and / or indicated on the Drawings.
3. Lumen depreciation shall be identified in terms of IES TM-21-11. Unless noted otherwise, luminaires shall provide a minimum L70 rating at the drive current provided product data shall indicate such.
4. Correlated color temperature (CCT) indicated on the product data sheets shall be provided in accordance with ANSI C78.377-2008 American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products and shall meet the requirements specified and / or indicated on the Drawings. Acceptable variation in color temperatures specified shall be +/- 275K.
5. Lumen output specified shall be lumens delivered from the luminaire at the color temperature specified.
6. Luminaires efficacy shall meet that specified / scheduled at the CCT specified.

J. LED Drivers

1. Drivers shall be universal voltage (120-277 volt) or shall be 208 volt, or 480 volt as required to meet project conditions.
2. Drivers shall be provided with protection against a transient line surge as noted on the Drawings.
3. Drivers shall be equipped with quick disconnect.
4. Power factor > 0.9.
5. Harmonic distortion < 20%.
6. Ambient temperature range: 104 degrees F to -30 degrees F.
7. UL listed.

2.09 PATHWAYS FOR STRUCTURED CABLING SYSTEMS

A. Non-continuous cable support system products manufactured by Erico CableCat (J-hook type), Panduit Tak-Ty (hook and loop cable tie), Panduit Extra-heavy cable tie (cable tie).

B. Size for 25% spare capacity.

C. Description:

1. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; UL Listed.
2. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.
3. Non-continuous cable supports sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.
4. Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.
5. Stainless Steel non-continuous cable supports are intended for indoor and outdoor use in non-corrosive environments or where only mildly corrosive conditions apply.

2.10 STRUCTURED CABLING

A. CAT 6 UTP Horizontal Copper Cabling

B. Manufacturer:

1. General (Cable)
2. Panduit NetKey (Jacks)
3. Commscope Uniprise
4. Berk-Tek / Leviton
5. Mohawk (Cable)
6. Belden (KeyConnect Jacks)
7. Substitutions according to Div 01 and provisions of this section.

C. Performance Requirement.

1. Horizontal four pair Category 6 copper cabling system shall be capable of supporting 1000 Base-T applications for a total distance of 100 meters with equipment cords. System shall provide "future proof" channel performance and guaranteed margins as noted in this document and is guaranteed to exceed ANSI/TIA-568-C.2 Category 6 specifications for Insertion Loss, NEXT, PSNEXT, ELFEXT, PSELFEXT and Return Loss to 250 MHz.
2. The System is Guaranteed 3.5 dB PSACR headroom at 250 MHz

D. Product: Construction shall be four twisted pairs of 23 AWG insulated solid conductors, with a ripcord, surrounded by a tight outer jacket.

E. Equal to General GenSPEED 6.

F. UTP Standard Plenum, Category 6+.

G. Jacket Color:

1. Blue for data.
2. Green for Building Automation including Lighting Controls.

H. Telecommunications Jacks.

1. Equal to Panduit Mini-Com.
2. Color: Verify and match existing jack color.
3. The communication jack shall be POE (Power over Ethernet) verified and tested to meet 802.3af cable standards, including third party component verification. 100% manufacturer tested.
4. Modular type RJ45 that snap into the four-port frame.
5. 8 position/8 conductor modular jack, with flush mount, rear loading, snap in fitting.
6. Jack shall be constructed with a punch type down termination method including a dust cover cap.
7. Jack shall be labeled with universal wiring diagrams 568A and 568B.
8. Jacks shall be available in multiple standard colors with optional color icon capabilities.
9. Category 6 jack shall meet Category 6 component performance according to ANSI/TIA/EIA-568-C.2 requirements.

I. Faceplates:

1. Provide Equal to Panduit Mini-Com Classic Series.
2. Accept a minimum of four (4) modular jacks. Provide (6) position faceplates if more than four jacks are shown on the drawings.
3. Provide blank filler plates where extra ports are not used.
4. Color to match adjacent wiring devices.

2.11 FIRE ALARM SYSTEM

A. Extend existing fire alarm system for device relocations as shown on the drawings. All wiring shall be in conduit. Only splice wiring within a junction box.

B. Quality Assurance

1. System Integrator: Company specializing in smoke detection, fire, and mass notification alarm systems with five years experience and that have personnel who possess a full knowledge and understanding of systems used for fire alarm and that have factory-trained personnel to perform system design installation, testing, training, and maintenance.
2. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems.

3. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.
4. System shall be installed in accordance with NFPA 72.
5. Manufacturer's Field Services: Provide services of a factory-authorized qualified service representative to supervise the field assembly and connection of components and the pretesting, and final testing.
6. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
7. Final Testing:
    a. Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.
    b. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.
    c. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
    d. Final Test, Certificate of Completion, and Certificate of Occupancy: Test the system as required by the Authority Having Jurisdiction.
    e. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

C. Manufacturer: Existing system is manufacturered by Potter (Model P400). Extend existing system as shown on the drawings with new devices as shown. All new devices shall be compatible with existing system and shall match existing devices. Verify and match existing wiring style for notification, signaling, and initiation circuits.

D. Provide all devices, accessories, wiring, connections, and programming to accommodate new devices shown.

E. Audible Alarm Notification: Verify and match existing.

F. Provide wiring per manufacturers recommendations.

G. Install all new fire alarm conductors in conduit. Conduit to be red.

H. All final connections shall be by equipment supplier.

I. Install system components and all associated devices in accordance with manufacturer’s approved shop drawings, applicable Building Codes, Fire Codes, and NFPA Standards. All devices shall be mounted and installed to comply with NFPA 72 and to meet ADA requirements.

J. Fire Alarm Wire:
    1. Provide wiring as recommended by manufacturer and by system vendor in compliance with local codes.

2. Match existing wiring style and configuration for initiation and notification circuits. All new conductors and to be installed in conduit.
3. Conductors shall comply with NFPA 70 Article 760. Conductors shall be stranded copper.
4. Number and size of conductors will be as specified by the manufacturer (not less than 18 AWG for SLCs and IDCs, and 14 AWG for NACs). All wires shall be color coded as suggested by the Manufacturer.
5. Power Limited Circuits: 300-volt minimum rated.
6. Non-Power Limited Circuits: 600-volt minimum rated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify conditions and constructions types prior to installation. Verify that surfaces that support Product(s) are ready to receive them. Examine location of equipment installation for compliance with installation tolerances and other conditions affecting performance of Work

B. Prepare drawings showing proposed rearrangement of work to meet Project conditions, including changes to work specified in other Divisions. Obtain permission of Architect before proceeding.

C. Review all Drawings including architectural, mechanical, structural, civil, and electrical drawings for extent of Work.

D. Examine equipment to ensure equipment is ready for electrical connection, wiring, and energization.

3.02 PREPARATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections. Determine connection locations and requirements.

B. Sequence and coordinate work with other trades so as to avoid conflict of space and time sequence. If interference develops, the matter shall be brought to the attention of the Architect for decision.

C. The Contractor shall coordinate exact routing and lengths required where conduit destination is indicated and routing is not shown.

D. Demolition:

1. Notify the Owner and Architect at least five (5) days prior to commencing demolition operations
2. Verify existing circuiting arrangements and control apparatus and wiring. Verify that abandoned wiring and equipment serve only abandoned facilities.
3. Review existing equipment and materials with the Owner, schedule or indicate equipment to be salvaged for re-use and equipment to be salvaged and turned over to the Owner.

E. Extension of existing circuits and or systems: Prior to connecting any new Work to existing circuits or systems Contractor shall provide field measurements and surveys required to ensure adequate capacity is available for new connections.

3.03 WORKMANSHIP

A. All workmanship shall be neat and complete in both effectiveness and appearance and shall be executed by persons licensed and skilled in the trade. Engineer reserves the right to reject any material or workmanship before, during or after construction.

B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

3.04 DEMOLITION AND REMODELING

A. Preparation

1. Notify the Owner and Architect at least five (5) days prior to commencing demolition operations.
2. Demolition Drawings are based on field observation and existing record documents. Report discrepancies to Architect before disturbing existing installation.
3. Verify existing circuiting arrangements and control apparatus and wiring.
4. Verify that abandoned wiring and equipment serve only abandoned facilities.
5. Review existing equipment and materials with the Owner, schedule or indicate equipment to be salvaged for re-use and equipment to be salvaged and turned over to the Owner.
6. Beginning of demolition means Contractor accepts existing conditions.
7. Extension of existing circuits and/or systems: Prior to connecting any new Work to existing circuits or systems Contractor shall provide field measurements and surveys required to ensure adequate capacity is available for new connections.

B. Installation

1. General Demolition
    a. Remove, relocate, and extend existing installations to accommodate new construction.
    b. Where indicated or required, remove existing electrical systems in walls, floors, and ceilings scheduled for removal.
    c. Where abandoned wiring serves equipment and / or facilities not indicated to be removed Contractor shall extend and / or reroute wiring to maintain service to the equipment that shall remain.
    d. Repair adjacent construction and finishes damaged during demolition and extension work.
    e. Maintain access to existing electrical installations which remain active. Modify installation or provide access door unit as appropriate.
2. Raceway and Box Demolition:
    a. Remove all abandoned conduit, unless indicated to remain for re-use or future work, including abandoned conduit exposed during demolition and located above accessible ceilings.
    b. Cut concealed abandoned conduit flush with walls and floors that are indicated to remain.

c. Remove abandoned boxes if conduit servicing them is removed.

d. Provide appropriate blank cover for abandoned boxes which are not removed.

e. Disconnect and remove abandoned panelboards and distribution equipment as indicated.

3. Conductor and Cabling Demolition:

a. Remove all abandoned conductors and cabling in their entirety.

b. Remove demolished branch circuits all the way back to the panel.

4. Equipment Demolition:

a. Where indicated or required, remove all luminaires, stems, brackets, hangers, supports, etc.

b. Remove, demount, and disconnect existing electrical materials and equipment indicated to be salvaged, and deliver same to the location designated for storage. Leave in good condition and store in orderly manner.

c. Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

5. Maintain existing systems in service until new systems are complete and ready for use.

a. Disable existing systems only to make switchovers and connections.

b. Notify Architect, Construction Manager, and Owner and obtain permission before partially or completely disabling systems.

c. Minimize outage duration and coordinate time with Owner at his convenience.

d. Make temporary connections to maintain service, feeders and branch circuits when outage time exceeds 8 hours or more.

3.05 CUTTING, PATCHING, AND FINISHING

A. General: Perform cutting, patching and finishing in accordance with Division 01.

1. Cut, remove, and legally dispose of material including but not limited to construction material, and other indicated material made obsolete by the new work.

2. Protect the structure, furnishings, finishes, and adjacent materials and installations not indicated or scheduled to be cut or removed.

3. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt into adjacent areas.

4. The Contractor shall not endanger the stability of the structure by cutting, excavation or otherwise.

5. Do not cut or alter work of any other trade without trade and Architect / Engineer's consent.

B. Perform cutting, patching and finishing of walls, floors, ceilings, roofs required to:

1. Uncover work to provide for installation of new or ill-timed work.

2. Remove and replace defective work.

3. Remove samples of installed work as specified for testing.

C. Upon written instructions from the Architect / Engineer, uncover and restore work to provide for Engineer's observation of concealed work.

D. In existing construction:

1. Electrical Contractor shall perform all cutting required and all necessary patching and finishing after completion to restore surfaces to original condition, unless otherwise indicated.
2. Use experienced installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched and finished. Works shall meet Project engineer's approval.

E. In new construction:

1. General Contractor will provide chases and openings in walls, floors, ceilings, partitions, etc., where shown or necessary to receive electrical work, but the Electrical Contractor shall furnish full information as to locations, dimensions etc., of such chases and openings including provision and proper setting of sleeves and other equipment in such time as to cause no delay to work of General Contractor.

F. Should any cutting be required for proper installation of electrical work because of failure to give the General Contractor the proper information at the time required, such cutting shall be done at the Electrical Contractors expense.

3.06 INSTALLATION

A. Installation shall comply with the industry standards referenced above and manufacturer's installation instructions.

B. Wiring Methods:

1. Single conductors type THHN/THWN in raceway.
2. Make connections to equipment with flexible metal conduit or liquid tight flexible metal conduit.
3. Make connections to luminaires with flexible metal conduit or factory furnished flexible fixture whips.
4. Flexible metallic conduit in generally not acceptable except where noted above.
5. Exposed raceway is generally not acceptable except in electrical, mechanical rooms or unfinished spaces. Coordinate with Owner and Architect or Engineer prior to installation of surface raceway.
6. Connectors: Use split bolt connectors for splices and taps, 8 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor. For 10 AWG and smaller copper conductor splices and taps use insulated spring wire connectors with plastic caps 10 AWG and smaller.
7. Where multiple neutral conductors are installed within a single conduit provide neutral conductors with a tracer (color corresponding to the color of the phase conductor).

C. Receptacles:

1. Install receptacles with grounding pole on top. Verify and match existing hospital device orientation.
2. Install GFCI receptacles where located in bathrooms, kitchens, garages, outdoors, or within six feet of water source.
3. Install weather resistant devices in all Damp and Wet locations per NEC 406.8.

D. Luminaires

1. Lay-in luminaires shall be secured to the building's structure at minimum of two points (other than the acoustical tile ceiling grid).

E. Grounding and Bonding shall comply with the regulatory requirements and industry standards referenced above. Specifically, NFPA 70 NEC Article 250. Provide a separate continuous copper equipment grounding conductor with all feeders and branch circuits.

F. Penetrations:

1. Effectively seal penetrations in exterior walls, roofs, and rated interior walls in accordance referenced standards and regulatory requirements.
2. Seal all conduits and cables passing through all floors, all walls, and all ceilings for the purpose of sound, heat, smoke and moisture control. Use material suitable for the wall construction (confirm suitability of material with Engineer or Architect prior to installation). Place sealing material around each conduit and raceway for the full thickness of the wall
3. No roof penetrations will be allowed.

G. Pathway for Structured Cabling:

1. Comply with ANSI/ TIA/ EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
2. Minimum conduit size shall be ¾". Unless noted otherwise, outlet rough-ins shall consist of 4" square deep box with single gang ring and ¾" raceway routed to the accessible ceiling space.
3. Where non-continuous cable supports are used cable shall be supported at maximum intervals of 36".

H. Structured Cabling:

1. Each jack shall be cabled directly from the telecommunication room to the remote outlet location via the communications cabling pathway (no splices) unless noted otherwise.
2. Maximum horizontal cabling length: 295 feet.
3. Wire all jacks according to ANSI/TIA/EIA T568-B configuration.
4. Terminations: Voice - 110 blocks. Data - patch panel. Or to match existing.
5. Provide 25% spare capacity at patch panels, wiring blocks, and cabling pathway.

3.07 IDENTIFICATION

A. Junction Boxes: Provide label indicating voltage, panelboard, circuit number, and description of system (e.g. general use, interruptible, life safety).

B. Receptacles: Indentify panelboard and circuit number serving device. Self-adhesive labels, black filled lettering on clear background.

C. Panelboards: Provide typed panelboard directory (revised typed directories for existing panels modified). Provide engraved nameplate with designation, feeder size, source of feeder, voltage and phase.

D. Disconnects and Motor Controllers: Provide adhesive label with designation of equipment controlled / feeding, circuit size, source of circuit, voltage, phase, and auxiliary control device.

E. Provide self-adhesive label for piloted lighting switches, exhaust fans, relays, contactors, time switches, communications faceplates (e.g. phone / data plates), and control panels. Coordinate description on label with Engineer.

F. Color code secondary service, feeder, and branch circuit conductors to match existing or, if no color code exists, as follows:

1.	Voltage	Phase A	Phase B	Phase C	Neutral	Grounding & Bonding	
2.	208/120	Black	Red	Blue	White	Green	
3.	480/277	Brown	Orange	Yellow	Gray		Green

G. Structured Cabling: Provide wire markers at each end of each cable, provide labeling each jack, each patch panel port, and each wiring block termination. Coordinate labeling convention with Owner and Engineer.

3.08 FIELD QUALITY CONTROL

A. Inspect each piece of electrical equipment for defects.

B. Replace defective drivers. Replace broken electrical and luminaire parts.

C. Adjusting:

1. Adjust wall plates to be level.
2. Adjust devices to be flush and secure behind wall plates.
3. Contractor shall, under actual operation, make amperage tests and circuit adjustments required to produce a balanced phase loading. Revise panel circuit directories as required

D. Cleaning:

1. Clean exposed surfaces of equipment to restore finish. Clean photometirc surfaces of luminaires.
2. Remove wire and insulation scraps and vacuum clean inside each panelboard, switchboard, starter, contactor, motor control center, disconnect switch, etc. Clean the interior of boxes to remove dust, debris and other material.
3. Scratches on painted surfaces shall be touched up with paint of equivalent quality and matching color.

3.09 FIELD TESTING

A. Operate each wall switch with circuit energized and verify proper operation. Verify that each receptacle device is energized. Test each receptacle device for proper polarity. Test each GFCI receptacle device for proper operation.

B. Test tightness of bolted electrical connections with calibrated torque wrench.

C. Take voltage and amperage measurements at each panelboard and disconnect switch with equipment served in operation.

D. Test connections to equipment for proper phase rotation.

E. Test report: Provide test report for each test performed. Report shall indicate date and time of test, personnel performing test, note condition of equipment (e.g. any defects), location of equipment, description of test, result of test (test data), other remarks (analysis and recommendations), description of modification made for improvement if applicable.

END OF SECTION