PIMA COUNTY ADMINISTRATION WEST BUILDING

XAW5TI - FIFTH FLOOR TENANT IMPROVEMENT SPECIFICATIONS

VOL. 1 OF 1

JULY 22, 2019

PIMA COUNTY FACILITIES MANAGEMENT
150 W. CONGRESS STREET
TUCSON, ARIZONA 85701

PROJECT MANUAL:

XAW5TI – FIFTH FLOOR TENAT IMPROVEMENT

Owner:	Pima County
Address:	150 W. Congress Street, Tucson, AZ 85701
Project Manager:	Pima County Facilities Management
	150 West Congress Street, 3rd Floor
	Tucson, AZ 85701
Phone:	+1 (520) 724 - 3774
Issued:	July 22, 2019

SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Edward A. Vergara II
2. AZ License # 46931
3. Responsible for Divisions 01-12 & 27.

B. Structural Engineer: **(Specifications on Sealed Drawings)**

1. Allan Ortega-Gutierrez
2. AZ License # 50642
3. Specifications on Drawing.

C. Plumbing Engineer: **(See GLHN Seal Page)**

1. Responsible for Division 21 thru 22

D. HVAC Engineer: **(See GLHN Seal Page)**

1. Responsible for Division 23

E. Electrical Engineer: **(See GLHN Seal Page)**

1. Responsible for Division 26.

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to .

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. N/A

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Change Directive: may issue a Change Directive on AIA Document G714. Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702/CMa and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The architect will return incomplete applications without action.

   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:

      a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
      c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for

Payment to by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. List of Contractor's staff assignments.
6. List of Contractor's principal consultants.
7. Copies of building permits.
8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
5. AIA Document G707, "Consent of Surety to Final Payment."
6. Evidence that claims have been settled.
7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
e. Indicate required installation sequences.
f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.

c. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.

3. Electrical Work: Show the following:

b. Light fixture, exit light, emergency battery pack, and fans.
c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

4. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
5. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 Software-generated form with substantially the same content as indicated above, acceptable to Architect.

    1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

    1. The following Contractor-generated RFIs will be returned without action:

        a. Requests for approval of submittals.
        b. Requests for approval of substitutions.
        c. Requests for approval of Contractor's means and methods.
        d. Requests for coordination information already indicated in the Contract Documents.
        e. Requests for adjustments in the Contract Time or the Contract Sum.
        f. Requests for interpretation of Architect's actions on submittals.
        g. Incomplete RFIs or inaccurately prepared RFIs.

    2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
    3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

        a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

    1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
    2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. Preconstruction Conference: The Pima County Construction Administrator will conduct a preconstruction conference before start of construction, at a time convenient to Owner and Architect.

1. The Pima County Construction Administrator will conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Be prepared to discuss items of significance that could affect progress, including the following:

   a. Tentative construction schedule.
   b. Critical work sequencing and long-lead items.
   c. Designation of key personnel and their duties.
   d. Lines of communications.
   e. Procedures for processing field decisions and Change Orders.
   f. Procedures for RFIs.
   g. Procedures for testing and inspecting.
   h. Procedures for processing Applications for Payment.
   i. Distribution of the Contract Documents.
   j. Submittal procedures.
   k. Sustainable design requirements.
   l. Preparation of record documents.
   m. Use of the premises and existing building.
   n. Work restrictions.
   o. Working hours.
   p. Owner's occupancy requirements.
   q. Responsibility for temporary facilities and controls.
   r. Procedures for moisture and mold control.
   s. Procedures for disruptions and shutdowns.
   t. Construction waste management and recycling.
   u. Parking availability.
   v. Office, work, and storage areas.
   w. Equipment deliveries and priorities.
   x. First aid.
   y. Security.
   z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Sustainable design requirements.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility requirements.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Progress Meetings: The Architect will conduct twelve (12) progress meetings over a four (4) month period.

1. Contractor to coordinate dates of meetings with preparation of payment requests.

2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of proposal requests.
        15) Pending changes.
        16) Status of Change Orders.
        17) Pending claims and disputes.
        18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Contractor to revise construction schedule within (2) two days after each progress meeting where revisions to the schedule have been made or recognized. Submit to Architect for issue of revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Paper copies where appropriate. Number to be determined at Preconstruction Conference..

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using Microsoft Project , and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. Construction Schedule Updating Reports: Submit with Applications for Payment, and within 24 hours from any time the critical path has slipped by one day or more.

E. Daily Construction Reports: Submit at monthly intervals.

F. Material Location Reports: Submit at monthly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

H. Special Reports: Submit at time of unusual event.

I. Qualification Data: For scheduling consultant.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contracdtors.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 5 days
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 20 days as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 5 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 5 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work Restrictions: Show the effect of the following items on the schedule:

   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Use of premises restrictions.
   e. Provisions for future construction.
   f. Material to be supplied by or Work to be performed by Owner

2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
   e. Fabrication.
   f. Sample testing.
   g. Deliveries.
   h. Installation.
   i. Tests and inspections.
   j. Adjusting.
   k. Curing.
   l. Building flush-out.
   m. Startup and placement into final use and operation.

3. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

   a. Structural completion.
   b. Temporary enclosure and space conditioning.
   c. Permanent space enclosure.
   d. Completion of mechanical installation.
   e. Completion of electrical installation.
   f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion and as may be requested by owner.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.

2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 1 or more calendar days behind the current approved schedule, submit a recovery schedule within 24 hrs, indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
Unless caused by approved additional scope requested by the owner, there will be no additional cost allowed for activities required to regain compliance with schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed critical path, horizontal. Gantt-chart-type, Contractor's construction schedule on the same day of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require one-month or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site.
3. Equipment at Project site.
4. Material deliveries.
5. High and low temperatures and general weather conditions, including presence of rain or snow.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events (see special reports).
9. Stoppages, delays, shortages, and losses.
10. Emergency procedures.
11. Orders and requests of authorities having jurisdiction.
12. Change Orders received and implemented.
13. Construction Change Directives received and implemented.
14. Services connected and disconnected.
15. Equipment or system tests and startups.
16. Partial completions and occupancies.
17. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At mthly intervals & as requested above, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
   1. Contractor's construction schedule.
   2. Product Data.
   3. Samples.
   4. Drawings.

1.2 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

   1. Include the following information on the label for processing and recording action taken.

      a. Project name.
      b. Date.
      c. Name and address of Contractor.
      d. Name and address of subcontractor.
      e. Name and address of supplier.
      f. Name of manufacturer.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to County using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

   1. On the submittal, record deviations from Contract Document requirements, including minor variations and limitations.

1.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar- chart type Contractor's construction schedule. Submit within 10 days after notice of award.

1.4 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

1, Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information.

2. Submittals: Submit 4 copies of each required submittal. The County will retain two, and will return the other marked with action taken and corrections or modifications required.

1.5 SAMPLES

A. Submit one fully fabricated Sample cured and finished as specified and physically identical with the material or product proposed.

1.6 SHOP DRAWINGS

A. Submit 4 copies of each required shop drawing. The County will retain two, and will return the other marked with action taken and corrections or modifications required.

END OF SECTION 013300

SECTION 014100 – SPECIAL PROVISIONS

PART 1 - GENERAL

1.1 CONTRACTOR PARKING: No contractor parking is available on county property for this project except for the two nearby public parking garages - El Presidio Garage (6'-2" height clearance, open 6am-8pm); and the Public Works Garage (7'-0" height clearance, open 6am-8pm).. Note – all Pennington Street parking, directly north of the Administration West building, is City property and must be reserved with the City. the normal all-day parking rate for the County Garages is $5.00. Contractors will be able to purchase monthly parking spaces for $85 per month. There are only 5 such parking spaces at the El Presidio garage, but many more are available at the Public Works Garage. Those two garages are closed on weekends but the Contractor will be able to park in the 'A' Level of the garage below the project between the hours of 5:30 pm and 7am Mon-Fri, and all day on weekends and holidays.

1.2 OWNER OCCUPANCY: The County will occupy the floors below and above this project during the entire period of construction. Cooperate with the County to minimize conflict.

1.3 OWNER'S WORK: The County will provide and install all voice/data cabling and equipment on this project. The Contractor shall allow access for this work, and any other miscellaneous work required by the Owner, during the course of construction.

1.4 CONTRACTOR ACCESS: The building does not have a freight elevator. Contractor access will be by way of one of the regular elevators. The contractor is responsible for protecting the elevator from damage during construction use. Coordinate with the Pima County Construction Manager regarding the use of the elevator.

1.5 CONTRACTOR ELEVATOR USE: The Contractor shall be allowed sole use of one building elevator except for the following hours –

On County work days, Monday thru Friday (excluding holidays), the freight elevator must be freed for public use between 7:00 am – 9:00 am, between 11:30 am – 1:30 pm, and between 3:30 pm – 5:30 pm.

1.6 CONSTRUCTION MATERIALS DELIVERY: The Contractor shall schedule all material deliveries outside of the following hours –

On County work days, Monday thru Friday (excluding holidays), no material deliveries shall be scheduled between 7:00 am – 5:00 pm.

Deliveries to the project may be made at any time outside of the hours noted in this section. The garage beneath the building is open 24/7 via the west entry, and the contractor will have access to the jobsite 24/7.

ADDITIONAL INFORMATION:

1. WINDOW WALL REMOVAL: Contractors will be allowed to remove existing window wall sections on the project as would assist with material and equipment deliveries or removal. The Contractor is responsible for the replacement of the removed window wall to the previous existing condition, and for building protection during all such work,
2. CRANE STAGING: Contractor must obtain City of Tucson permits to use Pennington Street (north of the building) or Congress Street (south of the building) for staging of any required crane use. This work must be scheduled only during the time period allowed for Construction Materials Delivery.
3. DUMPSTER LOCATION: Contractor must obtain City of Tucson permits to locate dumpsters outside the building along Pennington Street or Congress Street. There is no dumpster site available on County property for this project, except for within the three floors under remodel.
4. TEP REBATES: Three TEP Large Business Program Worksheets included in the solicitation documents. The Contractor shall fill out these forms at the completion of the project, for all related equipment installed on the project, and submit them to the County for the County's use in obtaining a TEP Rebate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01410

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. N/A

1.3 USE CHARGES

A. Water and Sewer Service from Existing System: Pay sewer and water use charges for sewer and water usage by all entities for construction operations.

B. Electric Power Service from Existing System: Pay electric-power-service charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

3. Indicate sequencing of work that requires water, such as plastering, and concrete grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

B. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

A. Common-Use Field Office: The Contractor will have use of vacant areas of the building for use as a field office, for storage of materials and as a fabrication/repair shop for building elements such as doors, windows and casework, and will return the space to the Owner, clean and in the condition indicated in the Contract Documents at the end of the project.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to private system indicated as directed by authorities having jurisdiction.

C. Water Service: Have water turned on in the building in the Contractor's name and connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: .

1. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located on paved areas to be determined by Owner that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 013300 "Submittal Procedures"
2. Section 017700 "Closeout Procedures"

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Products:

a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

2. Manufacturers:

a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

3. Basis-of-Design Product: Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

C. Visual Matching Specification: Where Specifications and drawings require "match Architect's sample" or "match existing (product) located in the Ajo Plaza South Building", provide a product that complies with requirements and matches Architect's sample or in-place existing installation. Architect's decision will be final on whether a proposed product matches.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
3. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas firstand proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
i. Remove labels that are not permanent.
j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
l. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
m. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
o. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Engineer(s) will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Engineer(s) will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide

essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.

9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system,

include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of

circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit record digital data files and one set(s) of plots.
3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy] of Project's Specifications, including addenda and contract modifications.

C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Note related Change Orders[, record Product Data,] and record Drawings where applicable.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Contractor.
e. Date of video recording.

2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.

d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:

   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:

   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

   1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
   2. Owner will furnish an instructor to describe Owner's operational philosophy.
   3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION 017900

SECTION 030500 – CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete densifier and sealer. All exposed concrete finished floor surfaces shall receive this densifier and a colored sealer.

1.2 RELATED SECTIONS:

A. Section 098200 Cementitous Floor Coating.

B. Section 099419 Painting.

1.3 SUBMITTALS

A. Comply with section 013300, Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.

C. Manufacturer's Certification: Submit manufacturer's ISO 9001/9002 certification.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: ISO 9001/9002 registered or provide proof of documentation quality assurance system. Quality Assurance system shall be registered by independent registrar accredited by ANSI Registrar Board (ANSI-RAB) or by another internationally recognized body.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Keep containers sealed until ready for use. Keep from freezing.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply sealer when concrete or air temperatures are below 40 degrees F or above 135 degrees F.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The Euclid Chemical Company, 19218 Redwood Road, Cleveland, Ohio 44110. Toll Free: (800) 321-7628. Phone: (216) 531-9222. Fax: (216) 531-9596. Web Site: www.euclidchemical.com.

B. Alternative products shall be considered provide alternative product have the essential characteristics meeting basis of design as approved equal as determined by the Architect.

2.2 MATERIALS

A. Basis of Design Product Description Essential Characteristics: Concrete Sealer: Euco Diamond Hard liquid densifier and sealer.

1. Type: Water-based, blend of siliconate polymers.
2. Compliance: Color as selected by Architect.

   a. Meets maximum VOC content of 400 g/L in accordance with EPA 40 CFR Part 59, Table 1, Subpart D for concrete protective coatings.
   b. Meets California and New Jersey air quality standards.

3. VOC Content: 0 g/L.
4. USDA approved.
5. Ultraviolet resistant.
6. Blush resistant.
7. Non-yellowing.
8. No odor.
9. Penetrating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine concrete surfaces to receive sealer. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Prepare concrete surfaces in accordance with manufacturer's instructions.

B. New Concrete: Cure concrete in accordance with manufacturer's instructions and as specified in Section 033900.

3.3 APPLICATION

A. Apply sealer to concrete surfaces in accordance with manufacturer's instructions.

B. Do not leave excess sealer residue on treated concrete surfaces. Remove excess hardened sealer.

C. Do not use as a curing compound.

D. Do not dilute sealer.

3.4 PROTECTION

A. Protect horizontal surfaces from traffic until sealer has cured.

B. Contractor shall protect concrete slab from damage until owner's acceptance of project. Contractor shall use whatever means necessary to protect the concrete slab.

END OF SECTION 030500

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 STRUCTURAL PERFORMANCE

A. Fabricate, and erect cold-formed metal framing.

1.2 AISI "SPECIFICATIONS"

A. "Specification for the Design of Cold-Formed Steel Structural Members":

1.3 SUBMITTALS

A. Product data for each type of cold-formed metal framing, accessory, and product specified; material mill certificates or qualified independent testing agency test reports; welder certificates.

1.4 WELDING STANDARDS

A. Comply with applicable provisions of AWS D1.1 "Structural Welding Code—Steel" and AWS D1.3 "Structural Welding Code—Sheet Steel.

1.5 COLD-FORMED METAL FRAMING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 GALVANIZED-STEEL SHEET

A. ASTM A 446, zinc coated according to ASTM A 525; G 60; Grade D, 50,000 psi minimum yield strength.

2.2 STEEL-FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 50,000 psi.

2.3 STEEL SHAPES AND CLIPS

A. ASTM A 36, zinc coated by the hot-dip process according to ASTM A 123.

2.4 MECHANICAL FASTENERS

A. Corrosion-resistant coated, self-drilling, self-threading steel drill screws with low-profile heads beneath sheathing; manufacturer's standard elsewhere.

2.5 GALVANIZING REPAIR PAINT

A. SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

2.6 CEMENT GROUT

A. Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

2.7 NONMETALLIC, NONSHRINK GROUT

A. ASTM C 1107.

PART 3 - EXECUTION

3.1 GROUTING

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.2 FRAMING MEMBERS

A. Install framing members in one-piece lengths.

3.3 TEMPORARY BRACING

A. Provide temporary bracing and leave in place until framing is permanently stabilized.

3.4 ERECTION TOLERANCES

A. Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Install cold-formed metal framing to a maximum out-of-square tolerance of 1/8 inch.

3.5 GALVANIZING REPAIRS

A. Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

END OF SECTION 054000

SECTION 055000 - MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General Contract Conditions and Division I Specification Sections, apply to Work of this Section.

1.2 DESCRIPTION OF WORK:

A. Definition: Miscellaneous metals includes items made from iron and steel, and aluminum shapes, plates, bars, strips, headed stud anchors, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere.

B. Types of work in this section include Miscellaneous Metals for:

1. Miscellaneous framing and supports.
2. Aluminum Framing Stiffner Plates.
3. Tube Steel Countertop Supports.

1.3 QUALITY ASSURANCE:

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and de-tails of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

PART 2 - PRODUCTS

2.1 DISSIMILAR MATERIALS:

A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint, unless otherwise specified sufficient to prevent galvanic or corrosive action.

2.2 MATERIALS:

A. Metals:

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.
2. Steel Plates, Shapes, Plates and Bars: ASTM A-36; weathering steel ASTM A606 where indicated; rolled floor plate, ASTM A785/A785M.
3. Steel Tubing: Cold-formed, ASTM A-500; or hot-rolled, ASTM A-501; weathering steel ASTM A606 where indicated.
4. Structural Steel Sheet: Hot-rolled, ASTM A-570; or cold-rolled ASTM A-611, Class 1; of grade required for design loading.
5. Galvanized Structural Steel Sheet: ASTM A-446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
6. Steel Sheet: ASTM A527 steel sheet, zinc coated.
7. Steel Pipe: ASTM A-53; type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.
8. Malleable Iron Castings: ASTM A-47, grade as selected by fabricator.
9. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported items, unless otherwise indicated.
10. Aluminum: ASTM B221, aluminum and aluminum alloy extruded bars, rods wire, shapes, and tubes.

B. Fasteners:

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
2. Bolts and Nuts and headed stud anchors: Regular hexagon head type, ASTM A-307, Grade A.
3. Lag Bolts: Square-head type, FS FF-B-561.
4. Machine Screws: Cadmium-plated steel, FS FF-S-92.
5. Wood Screws: Flat-head carbon steel, FS SS-S-111.
6. Plain Washers: Round, carbon steel, FS FF-W-92.
7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
8. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
9. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
10. Anchor bolts: ASTM A307.

C. Coatings:

1. Finish specified in Section 099419 for all exposed-to-view fabrications. Concealed units shall be primed with either same product or manufacturer's standard modified alkyd, rust-inhibitive primer.
2. Galvanizing Repair Paint: High-zinc dust content paint for re-galvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships).

2.3 FABRICATION, GENERAL:

A. Workmanship:

1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.
5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Galvanizing: Provide a zinc coating for those items shown or specified to be galvanized, as follows:

1. ASTM A-153 for galvanizing iron and steel hardware.
2. ASTM A-123 for galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strip 1/8" thick and heavier.
3. ASTM A-386 for galvanizing assembled steel products.
4. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

C. Shop Painting:

1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.
2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning," or SSPC SP-3 "Power Tool Cleaning," or SSPC SP-7 "Brush-Off Blast Cleaning."
3. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning."
4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide minimum uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
5. Apply 1 shop coat to fabricated metal items, except apply 2 coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.4 MISCELLANEOUS METAL FABRICATIONS:

A. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports as required to complete work.
2. Fabricate miscellaneous units to sizes, shapes, and profiles shown or, if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware and similar items.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION:

A. General:

1. Fastening To In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
2. Cutting, Fitting, and Placement: Perform cutting, drilling and fittings required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
4. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

3.3 ADJUST AND CLEAN:

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply 2 coats of galvanizing repair paint.

END OF SECTION 055000

SECTION 064023 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Fabricated cabinet units.

B. Countertops.

C. Shelving

1.2 QUALITY ASSURANCE

A. Perform work to custom quality in accordance with "Quality Standards" of the Architectural Woodwork Standards (AWS).

1.3 REFERENCES

A. Perform work to custom quality in accordance with "Quality Standards" of the Architectural Woodwork Standards (AWS).

1.4 SHOP DRAWINGS AND PRODUCT DATA

A. Submit shop drawings and product data in accordance with Section 013000. Submit shop drawings in format similar to AWS, including:

1. Cover sheet.
2. Project information sheet.
3. Specification sheet.
4. Typical joinery sheet.
5. Typical anchorage.
6. Floor plan showing woodwork.
7. Woodwork plans and elevations.
8. Typical sections.

1.5 SAMPLES

A. Submit samples of plastic laminate.

1.6 MOCK-UP

A. Provide mockups of one base cabinet, one wall hung cabinet, and one countertop. Base cabinet shall have at least one drawer. Mockup shall be of the material and finish to be provided. The Approved Mockup may be incorporated in the project.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS

A. Softwood Lumber: PS 20; graded in accordance with AWS; maximum moisture content of 6 percent.

ITEM	SPECIES	CUT
Drawers (Internal)	White Pine	Plain
Internal Frame	White Pine	Plain
Toebase	White Pine	Plain
Miscellaneous Supports		
Ledgers (concealed)	Fir	Plain

2.2 SHEET MATERIALS

A. Softwood Plywood: PS 1; rotary cut fir, graded in accordance with AWS.

B. Wood Particleboard: Mat formed, 45 lb minimum density, composed of wood chips, made with water resistant adhesive; of grade to suit application; sanded faces.

2.3 PLASTIC LAMINATE

A. Acceptable Manufacturers: Nevamar, Formica, and Wilsonart.

B. Horizontal Surfaces: High pressure laminate. Comply with NEMA LD-3, General Purpose Type, 0.05" thick, except .039" post forming grade.

C. Vertical Surfaces:

1. High pressure laminate. NEMA LD-3, GP28, or:
2. Low pressure laminate. NEMA LD-3, GP20. "Melamine" type is acceptable only for concealed shelving and storage room shelving.
3. Cabinet liner NEMA LD-3, CL-20 at semi exposed locations.

D. Color and Texture see room finish schedule.

2.4 ACCESSORIES

A. Adhesive: Type recommended by laminate manufacturer to suit application.

B. Edge Trim: Self edged in matching plastic laminate. Provide miter on edge bands.

2.5 FINISH HARDWARE: Provide finish hardware for construction of casework. Comply with ANSI A156.9, Type 2 (institutional) and as follows:

A. Hinges: Concealed type, dull chrome finish (edge fastening not allowed) 120° opening angle.

B. Pulls: Back-mounted wire pulls, NOM. 4 inch length, dull stainless steel finish.

C. Adjustable Shelf Clips: Provide recessed units in casework adjustable in 1" increments with manufacturers standard support clips. Dull chrome finish. No plastic clips.

D. Catches: Magnetic type.

E. Drawer glides: Full extension with nylon rollers and 100 lbs static capacity.

F. Door and Drawer Locks: Dead Bolt Mortise Locks.

2.6 FABRICATION

A. Casework and Top Construction:

1. Comply with AWS 1st Edition, 10/2009 custom grade; flush overlay construction.
2. Fabricate components from minimum 3/4 inch plywood sheet for custom grade plastic laminate finish. Cabinet bodies. NOTE: 3/4 inch medium density particleboard may be used for countertops.
3. Provide concealed fasteners.
4. Fabricate drawer sides and back from 1/2 inch plywood, face from 3/4 inch solid board with plastic laminate finish all sides, edges and ends. Fabricate drawer bottom of 1/4" plywood, minimum 3 ply.
5. Shelving: Fabricate shelving from 3/4 inch particle board with plastic laminate finish all sides, edges, and ends. Reinforce shelf if over 30" long.

B. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

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

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Locate counter butt joints minimum 2 feet from sink cut-outs.

E. Cap exposed plastic laminate edges with material of same finish and pattern.

F. Mechanically fasten splashbacks to countertops with steel brackets at 16 inches on center.

G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

H. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Set and secure casework in place rigid, plumb, and level.

B. Use purpose designed fixture attachments at concealed locations for wall mounted components.

C. Use threaded steel concealed joint fasteners to align and secure adjoining counter tops.

D. Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overlay trim for this purpose.

E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

F. Counter-sink anchorage devices at exposed locations used to wall mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

3.3 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION 064023

SECTION 066116 SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Section Includes:

1. Solid Surfacing Fabrications for countertops, vanities and windowsills as indicated, including trim and material needed for a complete installation.

1.2 RELATED WORK

A. Work of this section is related to work specified in the following sections:

1. Section 064023 - “Interior Architectural Woodwork”.
2. Section 093000 - “Ceramic Tile”.
3. Section 224000 - “Plumbing Fixtures”.

1.3 REFERENCES

A. Reference Standards: In addition to requirements, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:

1. ISSFA-2, “Classification and Standards Publication of Solid Surfacing Material”.
2. ANSI Z124-3 for vanities and Z124-6 for kitchen sinks.
3. NSF Standard 51 for use in both splash and food service areas.
4. New York City MEA for gas toxicity.
5. ASTM G21 “Fungal Resistance”, Method [A] [B], no growth.
6. ASTM G22 “Bacterial Resistance”, no growth.
7. Stain Resistance, ANSI Z124-6-5.2 1997.

1.4 DESIGN REQUIREMENTS

A. Design Load: Deflection limited to 1/360.

B. Design items with sufficient strength for handling stresses.

C. Accessible Design: Comply with 2006 IBC and ICC/ANSI A117.1 T2003 Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities.

1.5 SUBMITTALS

A. Product Data: Manufacturer's technical literature indicating physical properties and performance criteria for solid surfacing materials and related components.

B. Shop Drawings: Indicate design parameters, adjacent construction, materials, dimensions, thickness, fabrication details, tolerances, jointing methods, method of support, anchorages, integration with plumbing fixtures and connections, and colors.

C. Samples: Submit two, 2 inch by 2 inch samples representative of colors, patterns, textures, finishes and edge treatments. Approved samples will be retained as a standard for the work.

D. Informational Submittals: Submit following packaged separately from other submittals:

1. Manufacturer's written installation instructions.
2. Maintenance Data: Manufacturer's recommended cleaning and maintenance procedures. Include in project closeout documents.

1.6 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Company specializing in fabricating and installing solid surfacing fabrications similar in complexity to those required in this project, including specific requirements indicated.

B. Source Limitations: Obtain solid surfacing fabrications through one source.

C. Fire-Test-Response Characteristics: Provide solid surfacing fabrications with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL 723 or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution set quality standard for fabrication and installation.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 - "Project Management and Coordination."

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle, and protect materials in accordance with manufacturer's written instructions.

1. Provide protective coverings of suitable material. Take special precautions at corners.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install solid surfacing fabrications until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at design levels during the remainder of the construction period.

B. Field Measurements: Verify that field measurements are as indicated on Shop Drawings.

1.9 SEQUENCING

A. Sequence work to permit installation of adjacent affected construction, plumbing rough-in.

B. Coordinate sizes and locations of plumbing, cut-outs and other related Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

1.10 WARRANTY

A. Warranty: Provide manufacturer's 10 year limited warranty covering replacement of the material except for non-covered conditions as follows:

1. Minor stains, scratches, water spots, and burns which may be corrected by techniques covered in the manufacturer's Use and Care Guide.
2. Failure of solid surfacing joint material.
3. Failure due to structural failure of base cabinets or other solid surfacing substrate construction.
4. Use for purposes other than indoor finish material. See manufacturer's warranty for complete details.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Basis of Design Product Description Essential Characteristics: Acceptable Product and Manufacturer: Formica Solid Surfacing, Formica Corp., Cincinnati, OH.

B. Alternative products shall be considered provide alternative product has the essential characteristics meeting basis of design as approved equal / determined by the Architect.

2.2 MATERIALS AND COMPONENTS

A. Solid Surfacing Materials: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Colors and Patterns: As selected by Architect from manufacturer's full range.

B. Special Features: Eased edge treatments.

C. Accessories:

1. Adhesives: For seams and drop edges, Formica Solid Surfacing Seaming Cartridges, 9 ounce (260ml); color to blend with sheet material.
2. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 FABRICATION

A. Assemble work at shop following manufacturer's printed fabrication instructions and deliver to job ready for installation. Manufacture in largest practical pieces for handling and shipping without seams.

1. Grade: AWS, Custom.
2. Fabricate work square and to required lines.
3. Recess and conceal fasteners, connections, and reinforcing.
4. Design construction and installation details to allow for expansion and contraction of materials. Properly frames material with tight, hairline joints held rigidly in place.
5. Fabricate countertops and vanities with back splash and side splash pieces to profiles and sizes indicated.
6. Fabricate items to profiles shown with connections and supports as indicated or as required for complete installation in accordance with manufacturer's written instructions and approved submittals.
7. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm lay-out with manufacturer's cut-out templates before beginning work. Round corners of cut-outs and sand edges smooth.
8. Do not exceed manufacturer's recommended unsupported overhang distances.
9. Finish exposed surfaces smooth and polish to low sheen.
10. Radius corners and edges.

B. Countertops and Vanity Tops1/2 inch thick, Solid Surfacing, adhesively joined with no exposed seams, edge details as indicated.

C. Vertical Surfaces: 1/2 inch thick Solid Surfacing, adhesively joined with no exposed seams, edge details as indicated.

D. Windowsills: 1/2 inch thick, Solid Surfacing, edge details as indicated.

E. Countertops with Under-mounted Sinks: 1/2 inch thick, Solid Surfacing, edge details as indicated with under-mount sink.

F. Vanity Tops with Under-mounted Sinks: 1/2 inch thick, Solid Surfacing, edge details and back splash as indicated, with under-mount sink.

G. Tolerances:

1. Variation in component Size: Plus/Minus 1/4 inch.
2. Location of Openings: Plus/Minus 1/4 inch from indicated location.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine surfaces for conditions that would adversely affect execution.

B. Preparation: Take field measurements.

3.2 INSTALLATION

A. General: Install in accordance with manufacturer's written installation instructions and approved Submittals. Provide templates and rough-in measurements.

1. Set items plumb, level, rigid and solidly adhered to substrate.
2. Prefit items: Adjust supports to make fit. Align joints over support framing.
3. Apply dabs of silicone on supports; place items on supports and attach.

B. Splashes: Install splashes at back and sides of countertops and vanities using silicone. Apply silicone to back surface only. Place thin bead of seam adhesive along edge where splash seats.

1. Seal joint between vanity top and splashes and between splashes and walls as specified in Section 079200 “Sealants”.

C. Window Sills: Install sills tight to window framing and adjacent wall surfaces. Anchor with concealed fastening system to securely prevent rocking, racking, or displacement. Seal joint between sill at adjacent wall and window surfaces as specified in Section 079200 - “Sealants”.

D. Tolerances:

1. Maximum Variation From True Dimension: 1/8 inch.
2. Maximum Offset From True Position: 1/8 inch.

3.3 CLEANING AND PROTECTION

A. Cleaning:

1. Clean and polish fabrications in accordance with manufacturer's instructions.
2. Promptly remove excessive mastic and seam adhesive.
3. Clean tops and splashes in accordance with manufacturer's recommendations.

B. Protection:

1. Do not permit construction near unprotected surfaces.

C. Refer to manufacturer’s warranty and exclusions.

END OF SECTION 066116

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Thermal insulation in exterior wall construction.

B. Sound insulation at interior building partitions.

1.2 SUBMITTALS

A. Submit Manufacturer's data indicating type, thickness and surface burning characteristics of proposed insulation.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Owens Corning.

B. Johns Manville.

C. Certainteed.

D. Substitutions: Items of same function and performance are acceptable in accordance with Section 01600 – Substitutions and Instructions to Bidders.

2.2 MATERIALS

A. Thermal Insulation: Semi-rigid mineral fiber batts, unfaced, density of not less than 0.5 lb per cu ft; K-value of 0.27; ASTM C 665, Type I, flame spread 10, smoke developed 10, thickness as required to provide R values indicated.

B. Sound Attenuation Batts: unfaced, semi rigid mineral fiber mat, ASTM C 665, Type I, Flame spread 10, smoke developed 10. Provide 2" thick batts in 2-1/2" and 3" thick batts in 3-5/8" metal stud partitions, and 3-1/2" thick batts in 6" metal stud partitions where indicated on drawings and 6-1/4" unfaced "Sono batt" fiberglass insulation above suspended ceiling system in conference rooms only.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify adjacent materials are dry and ready to receive installation.

B. Verify mechanical and electrical services within walls have been installed and tested.

3.2 INSTALLATION

A. Install batt insulation in accordance with manufacturer's instructions.

1. Trim insulation neatly to fit spaces. Use batts free of damage.
2. Fit insulation tight in spaces and tight to mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

END OF SECTION 072100

SECTION 072700 - FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Through-penetration firestopping in fire rated construction.

B. Construction-gap firestopping at connections of the same or different materials in fire rated construction.

C. Construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies.

D. Construction-gap firestopping occurring at the top of fire rated walls.

1.2 REFERENCES

A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E119 - Method for Fire Tests of Building Construction and Materials.

C. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.

D. FM (Factory Mutual) - Fire Hazard Classifications.

E. UL - Fire Resistance Director:

1. Through-penetration firestop devices (XHCR).
2. Fire resistance ratings (BXUV).
3. Through-penetration firestop systems (XHEZ).
4. Fill, void, or cavity material (XHHW).

F. UL 263 - Fire Tests of Building Construction and Materials.

G. UL 723 - Test for Surface Burning Characteristics of Building Materials.

H. UL 1479 - Fire Tests of Through-Penetration Firestops.

I. WH (Warnock Hersey) - Certification Listings.

1.3 DEFINITION

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gases and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.

F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. Fire-Rated Construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
2. Smoke Barrier Construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.5 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.

B. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements:

1. Details of each proposed assembly identifying intended products and applicable UL System number, or UL classified devices.
2. Manufacturer or manufacturer's representative shall provide qualified engineering judgments and drawings relating to non-standard applications as needed.

C. Quality Control Submittals: Statement of qualifications.

D. Submittal Review and approvals shall occur prior to construction.

1.6 QUALITY ASSURANCE

A. Installer's qualifications: Firm experienced in installation of application of systems similar in complexity to those required for this project.

B. State Regulatory Requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers or UL classified devices.

C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Coordinate delivery with scheduled installation date, allow minimum storage at site.

B. Storage and Protection: Store materials in a clean, dry, ventilated location. Protect from soiling abuse, moisture, and freezing when required. Follow manufacturer's instructions.

1.8 PROJECT CONDITIONS

A. Existing Conditions:

1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental Requirements:

1. Furnish adequate ventilation if using solvent.
2. Furnish forced air ventilation during installation if required by manufacturer.
3. Keep flammable materials away from sparks or flame.
4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

PART 2 - PRODUCTS

2. 1 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrate type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.

1. Additional Requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.

2. Acceptable Manufacturers and Products: Those listed in the UL Fire Resistance Directory for the UL System involved.
3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer.

2.2 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.

B. Firestopping at construction gaps between tops of partitions and underside of structural systems.

C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.

D. Firestopping at floor and ceiling pipe penetrations.

E. Acceptable Manufacturers and Products: Those listed in the UL Fire Resistance Directory for the UL System involved.

2. 3 ACCESSORIES

A. Fill, Void or Cavity Materials: As classified under category XHHW in the UL Fire Resistance Directory.

B. Forming Materials: As classified under category XHKU in the UL Fire Resistance Directory.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify barrier penetrations or properly sized and in suitable condition for application of materials.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than four inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

D. Protect materials from damage on surfaces subject to traffic.

E. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See UL Fire Resistance Directory.

F. Where rated walls are constructed with horizontally continuous air space, or double stud frame construction, provide vertical, 12 inch wide fiber dams for full thickness and height of air cavity at maximum 15 foot intervals.

G. Install smoke stopping as specified for firestopping.

H. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

I. Keep areas of work accessible until inspection by applicable code authorities.

J. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.3 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

3.4 INSPECTION

A. All fire stopping shall be observed prior to covering up with other construction.

END OF SECTION 072700

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sprayed fire-resistive materials.

1.2 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Evaluation reports.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Asbestos: Provide products containing no detectable asbestos and compatible with existing applied fire proofing

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.

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

   a. Isolatek International.
   b. Pyrok, Inc.
   c. Schundler Company (The)
   d. Southwest Fireproofing Products Co.

2. Bond Strength: Minimum 430-lbf/sq. ft. (20.59-kPa) cohesive and adhesive strength based on field testing according to ASTM E736.
3. Thickness: To match existing depth
4. Combustion Characteristics: ASTM E136.
5. Surface-Burning Characteristics: Comply with ASTM E84.

   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 10 or less.

6. Compressive Strength: Minimum 100 lbf/sq. in. (689 kPa) according to ASTM E761.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
8. Deflection: No cracking, spalling, or delamination according to ASTM E759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
10. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E859.
11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer for the required fire-resistance design.

C. Bonding Agent: Product approved by fireproofing manufacturer.

D. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Repair existing fire proofing at locations of removed hangers and misc. attachments.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

D. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

   1. Test and inspect as required by the IBC, Subsection 1705.13, "Sprayed Fire-Resistant Materials"

B. Fireproofing will be considered defective if it does not pass tests and inspections.

   1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
   2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

C. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Repair fireproofing damaged by other work before concealing it with other construction.

C. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

SECTION 079200 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of each type of caulking of sealant work is indicated on the drawings, and by provisions of this section.

1.2 JOB CONDITIONS

A. Examine joint surfaces and backing, and their anchorage to the structure, and the conditions under which the joint sealer work is to be performed, to determine whether conditions are detrimental to the performance of the sealers. Do not proceed with the joint sealer work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions or when temperatures are below or above manufacturer's limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

1.3 SUBMITTALS

A. Manufacturer's data on each type sealant listed documenting compliance with specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS SCHEDULE

A. Caulk and seal joints and embed materials in accordance with following schedules. In general, use gun grade materials for vertical joints and pour grade for joints in horizontal plane. Colors shall match or be compatible with adjacent surfaces as approved by the Architect.

1.	Exterior joints not otherwise scheduled	- polysulfide sealant or polyurethane general purpose sealant
2.	Horizontal joints in concrete slabs and decks	- polyurethane sealant, horizontal grade
3.	Perimeter and penetrations in partitions indicated to receive acoustic insulation, concealed locations	- acoustic sealant
4.	Electrical boxes and devices in acoustic partitions	- moldable sheet acoustic sealant
5.	Openings 1/4" and less between walls or partitions and built in or surface mounted equipment and fixtures	- acrylic sealant
6.	Interior wet locations	- sanitary silicone

7.	Pipe sleeves and penetrations except where firestop materials are required in rated construction	- polysulfide or polyurethane, general purpose
8.	Glazing butt joints	- "structural" silicone.

2.2 DELIVERY AND STORAGE

A. Deliver materials to the job in manufacturer's original unopened containers.

1. The containers shall include the following information on the label: supplier, name of material, formula of specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time when applicable at the standard conditions for laboratory tests.

B. All materials shall be carefully handled and stored to prevent inclusion of foreign materials, or exposure to temperatures exceeding 90 degrees F.

1. Caulking compound or components outdated as indicated by shelf life shall not be used.

2.3 SEALANTS

A. Polysulfied:

1. One Part: ASTM C920, Type M, Class 25, Grade NS, Shore "A" 20-40.

B. Polyurethane:

1. General Purpose, Two Part: ASTM C920, Type M, Class 25, Grade NS, Shore "A" 20-40.
2. Horizontal Grade, Two Part: ASTM C920, Type M/S, Class 25, Grade P/NS, Shore "A" 36-50.

C. Acrylic: ASTM C834.

D. Acoustical Sealant: One component acoustical sealant, non-drying, non-hardening synthetic rubber. Provide caulk grade and formable sheets or putty.

E. Silicone: ASTM C920, Type S, Class 25, Grade NS, Shore "A": 25-30, non-yellowing, mildew resistant.

F. "Structural" Silicone: ASTM C920, Type S, Class 25, Grade NS, uses NT, G, and A; FS TT-S-001543; plus or minus 25% joint movement capability.

G. Back-up Booker Rod Materials: Closed cell resilient foams, flexible tubes or beads, jute or oakum, as indicated on the drawings or as required for proper caulking of joints. Back-up shall be clean, free of oil grease, or other substances that might stain or otherwise harm the effectiveness of the sealant.

H. Bond-Preventive Materials: Wax paper, aluminum foil, polyethylene tape or other material approved by sealant manufacturer.

I. Other Caulking Accessories: Primers, admixtures, bedding tapes and similar materials, used as a part of caulking system shall be products recommended by the sealant manufacturer for use with his product.

J. Latex and butyl sealants shall not be used.

PART 3 - EXECUTION

3.1 APPLICATION

A. Execute work in compliance with the sealant manufacturer's printed direction. Assure that all surfaces are clean and dry, and that the brushes, rags and solvent used for cleaning are free of oil and grease.

1. Caulk only when the ambient temperature is over 40 degrees F; when using polysulfied materials in cold weather make provisions for heating areas as required to hasten cure.
2. Caulk other joints with complete adhesion on both sides of the joint and with bond break at the back of the joint.
3. Tool joints to assure full compact joints with optimum adhesion.
4. Caulk at such times as to prevent blowing dust from adhering to surface of bead before it skins over.
5. Cover bead for protection where necessary.

B. All joints shall be observed by the Owner prior to application of sealant.

3.2 SURFACE PREPARATION

A. Masonry and Concrete: Remove all loose particles, curing compounds, frost, oil, grease and other foreign matter. Concrete shall be fully cured. Remove soluble alkaline salts by washing with 5% solution of muriatic acid, rinsed with clear water and dried. Sand blast or power sand surfaces that have absorbed oil to insure clean surfaces.

B. Metal: Remove surface coatings or corrosion by sand blasting, wire brushing or chemical cleaners recommended by the manufacturer. When chemical solvents are used wipe the surface clean and dry with drying cloth while the surface is wet with solvent.

C. Galvanized Metal: Neutralize with acid.

D. Wood: Sand or scrape surfaces to remove foreign material and expose clean firm wood.

E. Aluminum: Remove corrosion with aluminum wool or suitable rubbing wheel. Do not damage or mar exposed finish.

3.3 PRIMER

A. Shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not receive primer.

3.4 BOND BREAKER

A. Where necessary, apply suitable bond breaker to prevent bond between back of the joint and sealant.

3.5 BACKING

A. Fill joints with compatible backing so that sealant size will meet the following requirements:

1. Minimum Width: Unless otherwise detailed, not less than 1/4".
2. Ratio of Depth to Width: For widths up to 1/2" equal; and for widths over 1/2" depth approximately 1/2 the width but in no case less than 1/2".

3.6 MASKING

A. Apply masking tape along side of exposed joints as required to avoid contamination of adjacent surfaces. Do not touch cleaned and primed surfaces with masking tape as oils from tape may impair adhesion. Remove tape immediately after the bead or tooling is finished and before surface skin has started to form.

3.7 CURING

A. Accelerate cure, where needed, by treating joint with fine spray of water or otherwise as recommended by the manufacturer.

3.8 CLEANING

A. The surfaces adjoining the caulked and sealed joints shall be cleaned of smears and other soiling resulting from the caulking and sealing application as work progresses.

3.9 WORKMANSHIP

A. Only experienced, qualified contractors shall perform the work described under this section.

B. Joints shall not be sealed until they are in full compliance with the drawings.

C. Install preformed compression seals so that material is compressed to approximately 1/2 of initial thickness.

3.10 OTHER TRADES

A. Other trades will be coordinated by the General Contractor in order to avoid damage to a completed, sealed joint.

B. Caulking done by the painter in preparation for final painting shall not be considered as meeting the requirements of this section.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

1.2 SUBMITTALS

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

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door/Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Temperature-Rise Limit: Where indicated provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

B. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld Building Products, LLC.

2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Kewanee Corporation (The).
5. Mesker Door Inc.
6. Steelcraft; an Ingersoll-Rand company.
7. Windsor Republic Doors.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Mineral-Fiber Insulation: ASTM C 665, Type I.

H. Glazing: Division 08 Section "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick, end closures or channels of same material as face sheets.
5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet 1 gauge minimum. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 1 and Physical Performance Level C (Standard Duty), Model 1 (Full Flush).

a. Width: 1-3/4 inches.

C. Hardware Reinforcement: ANSI/SDI A250.6.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8.

B. Interior Frames: Fabricated from cold-rolled steel sheet 16 gauge minimum.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Wood Doors: [0.042-inch- (1.0-mm-)] [0.053-inch- (1.3-mm-)] [0.067-inch- (1.7-mm-)] thick steel sheet.
4. Frames for Borrowed Lights: 0.042-inch.

C. Hardware Reinforcement: ANSI/SDI A250.6.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 HOLLOW METAL PANELS

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

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, same material as door face sheet.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, same material as frames.

D. Terminated Stops: Where indicated, terminate stops 6 inches above finish floor with a [45] [90]-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

2.8 LOUVERS

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

1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.10 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      1) Three anchors per jamb up to 60 inches high.
      2) Four anchors per jamb from 60 to 90 inches high.
      3) Five anchors per jamb from 90 to 96 inches high.
      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

   b. Compression Type: Not less than two anchors in each jamb.
   c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.

   a. Single-Door Frames: Three door silencers.
   b. Double-Door Frames: Two door silencers.

D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
   3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
   4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4. Provide loose stops and moldings on inside of hollow metal work.
   5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

   1. Shop Primer: ANSI/SDI A250.10.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. At fire-protection-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable glazing stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors (drive pins or 1-1/2 inch ramset anchors).

   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Solid core wood doors, with flush faces.

1.2 RELATED WORK

A. Section 087100: Finish Hardware.

B. Section 099419: Painting.

1.3 REFERENCE STANDARDS

A. AWS Quality Standards.

B. National Wood Window and Door Association (NWWDA), IS-1 Series.

C. National Fire Protection Association (NFPA).

D. U.S. Department of Commerce, Product Standards (PS).

1.4 SUBMITTALS

A. Submit product data including identification marking codes and shop drawings.

B. Shop drawings shall be of sufficient detail and scale to determine compliance with the intent of the quality grades specified. Shop drawings shall also indicate general construction and jointing methods.

C. Submit 6" x 6" cross-sectional sample of typical solid core wood door corner for review and as example standards for all doors to be supplied.

1.5 GUARANTEE/WARRANTY

A. Provide written lifetime guarantee for interior doors.

B. Guarantee: Provide for replacement including cost of rehanging and refinishing, at no cost to Owner, wood doors exhibiting defects in materials or workmanship including warp and de-lamination.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver doors to job site individually wrapped in factory sealed heavy polyethylene bags. Individual cartoning is not required.

B. Store doors flat uniformly supported off the floor and under cover at temperatures between 40 and 100 degrees F and relative humidity of 30 to 60 percent.

1.7 IDENTIFICATION MARK

A. The Top Edge of Each Door: Bearing an identification mark, either a stamp, brand or other indelible mark, giving the manufacturer's name, the door's trade name, the construction of the door, code date of manufacturer, and the quality.

B. The Identification Mark: Accompanied by either of the following additional requirements:

1. An identification mark or a separate certification including the name of the inspection organization.
2. Identification of the standards for the door, including glue type.
3. Identification of preservative treatment for stile and rail doors.
4. Identification of veneer and quality certification.
5. The National Wood Window and Door Association Registered Hallmark edge stamp and glue bond mark plug.

PART 2 - PRODUCTS

2.1 DOOR TYPE(S)

A. Flush faced solid core wood doors, 1-3/4 inches thick.

2.2 DOORS

A. Flush Interior Doors:

1. Veneer for Stain Finish:

a. AWI/NWWDA Premium Grade 1, 7 ply, Grade A, select white birch without heartwood, flat cut (plain sliced), book matched, balance matched and pair matched, vertical edges, solid birch hardwood.
b. Minimum veneer leaf component in 9 inches.

2. Construction:

a. Non-rated doors, particle board, core, Type I, 28-30 lbs/cu ft, Class 1, P.S. 236; glue to stiles and rails and sand before laminating.
b. 20 min. rated doors, particle board, core, Type I, 28-30 lbs/cu ft, Class 1, P.S. 236; glue to stiles and rails and sand before laminating.

2.3 FABRICATION

A. Fabricate doors in accordance with requirements of AWI and NWWDA Standards.

B. Provide doors with minimum of 6" top rails, minimum 1-1/8" minimum rail, and minimum 1-3/8" vertical stiles. Rails and stiles shall be solid hardwood.

C. Provide minimum 6 inch solid hardwood surrounds at light and louver openings.

D. Reinforce doors to receive locksets and closers with solid hardwood blocking.

E. Provide glazing stops of birch hardwood matching face veneers at non-labeled doors. Provide glazing stops conforming with NFPA 80 and door listing at fire rated doors.

2.4 FINISH

A. Field finish as specified in Section 099419.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Allow doors to become acclimated to finished building heat and humidity before hanging.

B. Do not remove labels from fire-rated doors.

C. All machining, cutting, beveling, and preparation for hardware shall be performed at the project site:

1. Hang doors and install all hardware prior to field finishing as specified in Section 09900. If doors are not to be immediately finished, reinstall polyethylene shipping bags over hung doors.
2. Bevel and trim doors three sides to provide 1/8 inch reveal.
3. Prepare doors to receive all specified items of hardware (especially smoke gaskets and weather strips). Doors shall close and latch without binding.
4. Demount doors and remove all hardware prior to application of finish.
5. Re-hang doors after finishing as complete.

D. Install doors plumb and square, and with a maximum diagonal distortion of 1/8". Doors may not extend beyond 1/16" from the face of the jamb, nor more than 1/8" behind the jamb face with space between jamb and door to be no more than 1/8".

E. Install all fire rated doors in accordance with NFPA-80. All fire door preparation must be done by a licensed factory, with the exception of surface applied hardware, function holes for mortise locks, holes for labeled viewers, a maximum of 3/4" undercut, and protection plates.

F. Coordinate installation of glazing with Section 088000. Install lights in fire rated doors in accordance with NFPA 80.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide access doors where shown and where required to access work contained in Divisions 21, 22, 23 and 26.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Access doors in fire-rated walls or ceilings shall bear appropriate label.

1.3 SUBMITTALS

A. Product Data: Submit approved test data or State Fire Marshal listing for fire-rated assemblies.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver and store special doors in manufacturer's standard protective packaging.

B. Do not remove protective packaging until time of installation.

1.5 JOB CONDITIONS

A. Coordination: Coordinate access door locations with all trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Access Doors, Fire Rated:

1. Door Panel: Form of minimum 20 gauge steel sheet, insulated sandwich type construction.
2. Frame: Form of 16 gauge steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in masonry. Weld exposed joints in flange and grind smooth. Provide expanded galvanized metal lath perimeter wings when installed in plastered partitions.
3. Automatic Closing Device: Provide automatic closing device for each door.
4. Hinge: Continuous steel hinge with stainless steel pin.
5. Latches: Minimum two self-latching. Mortise case in door.

B. Access Doors, Flush Panel:

1. Door Panel: Form of 16 gauge steel sheet. Reinforce as required to maintain flat surface.
2. Frame: Form of 16 gauge steel sheet of depth and configuration to suit material and type of construction where installed. Provide surface mounted units having frame flange at perimeter where installed in masonry. Weld exposed joints in flange and grind smooth. Provide expanded galvanized metal lath perimeter wings when installed in plastered partitions.
3. Hinge: Concealed continuous spring hinge to allow panel to open 175 degrees. Provide removable hinge pin to allow removal of panel from frame.
4. Lock: Flush, screwdriver operated cam lock.

C. Finish:

1. Factory applied baked prime coat for paint as specified in Section 099419.

D. Sizes:

1. Wall access doors, minimum 16 x 16 inches, unless larger size indicated on drawings.
2. Ceiling access doors, all downward-opening, minimum 24 x 24 inches unless larger size indicated on drawings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that openings to receive access doors are satisfactory for their installation. If unsatisfactory conditions exist, do not commence installation until such conditions have been corrected.

3.2 INSTALLATION

A. Install access doors, including associated accessories in accordance with manufacturer's instructions.

B. Install access panels at ceramic tile aligned and centered with the layout grid.

3.3 ADJUSTMENT AND CLEANING

A. Following installation, adjust access doors for smooth operation.

B. Clean access doors in accordance with manufacturer's instructions.

3.4 PAINTING

A. Field apply finish paint as specified in Section 099419. Match adjoining wall or ceiling color.

B. Paint doors in the open position. Paint shall be sufficiently dry and hard, to prevent damage to the finish prior to opening or closing the access doors.

END OF SECTION 083113

SECTION 084313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For aluminum-framed storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Arcadia, Inc.

2. EFCO Corporation.
3. Kawneer North America, an Arconic company.
4. YKK AP America Inc

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

   a. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
   e. Failure of operating units.

2.3 ALUMINUM-FRAMED STOREFRONT SYSTEMS

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Interior Vestibule Framing Construction: Non-thermal.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Finish: Clear
4. Fabrication Method: Field-fabricated stick system.
5. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
6. Steel Reinforcement: As required by manufacturer.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.5 MATERIALS

A. Sheet and Plate: ASTM B209

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221

C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

D. Structural Profiles: ASTM B308/B308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611 or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure non-movement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints otherwise indicated.

G. Install components plumb and true in alignment with established lines and grades.

3.2 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

B. Aluminum-framed storefronts will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 084313

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum windows for exterior locations.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. Window: 10 Insert number years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.
c. Aluminum Finish: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AAMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: CW
2. Minimum Performance Grade: 40

2.2 ALUMINUM WINDOWS

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

1. Arcadia, Inc.
2. EFCO Corporation.
3. Kawneer North America, an Arconic company.
4. YKK AP America Inc

B. Operating Types: Fixed

C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

D. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.

1. Kind: Fully tempered

E. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

D. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.4 ALUMINUM FINISHES

A. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

1. Color: Clear Anodized

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

C. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085113

SECTION 087100 - FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Finish Hardware accessories and templates.

B. Related Work Specified Elsewhere:

1. Section 081416: Wood Doors.
2. Section 087160: Powered Door Operators.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Fire Door Hardware: Comply with NFPA Standard No. 80 and as follows:

a. Rated doors shall be positive latching
b. Provide only such hardware which has been tested and listed by UL for the type and size of each door required, and complies with the requirements of the door and door frame labels.

2. Comply with Arizona Revised Statutes, Title 34, Chapter 4, Section 34-401 through 34-411 and Guidelines of the Americans with Disabilities Act (ADA) for barrier-free access for handicapped – ANSI A117.1 2006 edition.
3. Exit Doors: Openable at all times from the inside without the use of a key or any special knowledge or effort.
4. 2006 International Building Code.

B. Qualifications:

1. Obtain each kind of hardware latch and lock sets, hinges, and closers from only one manufacturer, although several may be indicated as offering products complying with requirements.
2. Hardware supplier shall be a direct factory contract supplier who has in his employment a certified hardware consultant (AHC) who is available at all reasonable times during the course of the work for project hardware consultation to the Owner, Architect, and Contractor.

C. Schedule Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish, function, or other quality of significance. However, do not make substitutions after the acceptance of hardware supplier's completed hardware schedule.

D. Design Criteria: Intent of specification is to provide complete hardware for all doors in project. It is Contractor's responsibility to examine Contract Documents and call omissions to Owner's attention prior to bid for instructions. No extras will be allowed. Omissions not rectified as stated herein shall be furnished and installed at no extra cost to Owner.

E. Reference Standards:

1. BHMA - Builders Hardware Manufacturers' Association.
2. NFPA - National Fire Protection Association: No. 80 – "Standard for Fire Doors and Windows."

1.3 SUBMITTALS

A. Samples: Upon request, submit samples of each finish hardware item. Samples, if accepted for use on the project, may be incorporated in the work with prior authorization.

B. Product Data: Submit manufacturer's technical information for each item of hardware.

C. Hardware Schedule: Submit hardware schedule suitable for coordination of work. Submittal is for record purposes and does not relieve Contractor from compliance with the Contract Documents. Organize hardware schedule into "hardware sets" indicating complete designation of every item required for each door or opening. Include the following information:

1. Openings: Identification, locations, hands, sizes, materials, and labels.
2. Items: Names, quantities, identifications, manufacturers, catalog numbers, sizes, accessories, fasteners, and finishes.
3. Explanation: Abbreviations, symbols, codes, etc. contained in schedule.
4. Mounting: Locations for hardware by dimension. Comply with BHMA "Recommended Locations for Builders Hardware, for Standard Steel Doors and Frames" for all door types.

D. Shop Drawings and Product Data: Submit Finish Hardware Schedule and product data for each item of hardware.

E. Certification: Approval numbers for fire-rated assemblies.

F. Closeout Submittals:

1. Submit maintenance instructions and parts lists for all items of hardware, including sources for parts.
2. Deliver to Owner one set of tools required for installation, removal, or adjustment of hardware.
3. Deliver to Owner dogging keys, emergency release keys, and other miscellaneous materials and accessories supplied with hardware for maintenance.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery: In manufacturer's original packaging, clearly identified as to type of item, manufacturer, model number, and finish are marked in accordance with Finish Hardware Schedule.

1.5 JOB CONDITIONS

A. Coordination: Coordinate hardware with other work. Furnish all hardware items of proper design for use on doors and frames of thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function.

B. Templates: Furnish hardware templates for preparation of doors and frames and installation of hardware.

1.6 WARRANTY

A. Provide special warranty as follows:

1. Closers: Ten years.
2. All other hardware: Two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approval of manufacturers, other than those listed, shall be in accordance with Instructions to Bidders.

Item	Manufacturer	Acceptable Substitute
Hinges	Stanley	Lawrence, Hager, McKinney, Bommer
Locks, Latches, and Lock Cylinders	Russwin/Corbin	None
Closers	LCN	Sargent
Silencers	Builders Brass	Ives, Quality, Trimco
Kick plates	Builders Brass	Ives, Quality, Trimco
Stops & Holders	Builders Brass	Ives, Quality, Trimco
Seals & Bottoms	Pemko	National Guard, Zero
Push, Pull Plates	Quality	Trim, Rockwood
Powered Door Operators	Horton	Dor-O-Matic, Gyro-Tech Systems, Access Technologies
Panic Devices	Russwin/Corbin	None

2.2 MATERIALS

A. Locksets: All locksets and latchsets shall comply with County Standards. Strikes shall be 16 gauge curved steel, bronze or brass, with 2 inch deep box construction and have lips of sufficient length to clear trim and protect clothing.

1. Locks shall have minimum 1/2 inch throw. All deadbolts shall have 1-inch minimum throw.
2. Lock Series and Design:

a. Corbin – Russwin 2000 Series, mortise lockset, with lever handle and rose.

B. Hinges: All doors shall have non-removable (NRP) pin. All hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees. Furnish hinges with steel pins and ball bearings.

1. Furnish three (3) hinges per leaf to 7 foot 6 inch height.
2. Size listed in Hardware Sets indicates height by width.

C. Surface Door Closers: Full rack and pinion type with removable non-ferrous case and cast iron body. Provide sex bolts and grommets at all doors. Place closers inside rooms. Closers shall be non-handed, non-sized, and adjustable.

D. Kick Plates: Provide with four (4) beveled edges, 10-inches height by door width less 2-inches. Furnish with machine or wood screws of bronze or stainless steel to match other hardware.

E. Seals: All seals shall be finished to match adjacent frame color. Solid neoprene to be MIL Spec. R6855-CL III, Grade 40. Sponge neoprene to be MIL Spec. R6130, Type II, Group C.

F. Screws: All exposed screws shall be Phillips head.

G. Silencers: Furnish silencers for interior hollow metal frames, three (3) for single doors, and four (4) for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive rated door assemblies.

2.3 FINISH

A. Generally to be BHMA 626 Dull Brushed Chromium.

B. Door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material.

2.4 CYLINDERS

A. All locks and latches shall be shipped without permanent cylinders. Contractor shall install all permanent cylinders and perform all keying as directed by PCFM Project Manager/Locksmith.

B. The Contractor shall provide his own temporary construction and testing cylinders. "Removable core" and "Interchangeable core" cylinders are not acceptable.

C. Construction keying is required at all doors separating the work area from occupied areas. The Contractor shall provide the Owner with keys to the area of work during construction. Provide three (3) keys for each lock, and provide master keys for each master system (6 maximum) and grand master keys for each grand master system, three maximum. Deliver keys to PCFM Project Manager.

D. All cylinders must be D-1 Keyway, six pin. Cylinders should be ordered zero bitted, Pima county Facilities Management (PCFM) will provide biting charts when the end user has determined needs.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each hardware item per manufacturer's instructions and recommendations. Do no install surface mounted items until finishes have been completed on the substrate. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

3. 2 ADJUSTING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

B. Latches shall be centered in strikes.

1. Filing or cutting of strikes is prohibited.

C. Readjust door closers after final air balance is completed.

3.3 SCHEDULE OF FINISH HARDWARE

A. Legend of listed manufacturers:

1. Hinges: Stanley
2. Locksets: Russwin / Corbin
3. Closers: LCN
4. Flush bolts and Coordinators: Glynn-Johnson
5. Kick plates, Trim: Builders Brass Works, IVES
6. Thresholds and Weatherstrip: Pemko
7. Powered Door Operator: Horton
8. Panic Device: Russwin-Corbin
9. Miscellaneous: As noted

SCHEDULE OF FINISH HARDWARE

Hardware Set #1 Bathroom Doors

Qty Active	**Qty Inactive**	**Description**		**Finish**	**Mfgr.**
3	0	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
0	0	Lockset	None		-
1	0	Kickplate	10"x 2" LDW	626	BBW
1	0	Wall Stop	WC12X	626	BBW
1	0	Silencer	HM Frame mfgr.	-	
1	0	Powered Operator Closer	4100 Surface Mounted – Parallel arm (outswing)	626	Horton
2	0	Activation Device	Ingress/Egress push plates		Horton
1	0	Door Push Plate	47E	626	BBW
1	0	Door Pull	1618	626	BBW
1	0	Electric Strike	626	626	Adams Rite

Hardware Set #2 Office and Conference Room Doors

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3	0	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Lockset	ML2051 - NSF (office function)	626	Corbin – Russwin
1	0	Wall Stop	WC12X	626	BBW
1	0	Silencer	HM. Frame mfgr.	-	-
0	0	Closer	(none)	-	-

Hardware Set #3 Utility Room Doors

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3	0	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Lockset	ML2057 – NSF (storeroom function)	626	Corbin – Russwin
1	0	Wall Stop	WC12X	626	BBW
1	0	Silencer	HM Frame mfgr.	-	
1	0	Closer	LCN 4040T with spring cushion arm	626	LCN
1	0	Auto Door bottom	412CPKL	Alum	Pemko

Note: Auto door bottom locations as indicated on door schedule sill detail.

Hardware Set #4 Break Room Door

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3		Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Lockset	ML2051 - NSF (office function)	626	Corbin Russwin
1	0	Kickplate	10"x 2" LDW	626	BBW
1	1	Wall Stop	WC12X	626	BBW
1		Silencer	HM Frame mfgr.	-	-
1	0	Closer	LCN Cush-N-Stop 4114H-Cush (with 90 deg. Dead stop)	626	LCN

Hardware Set #5 Mechanical Room Doors

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3	3	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Lockset	ML2057 – NSF (storeroom function)	626	Corbin Russwin
1	1	Wall Stop	WC12X	626	BBW
1	1	Silencer	HM. Frame mfgr.	-	
1	0	Closer	LCN 4040T with spring cushion arm	626	LCN
0	1	Flush Bolts	FB51T, FB51B	626	Glynn Johnson
1	0	Astragal	355BS		Pemko
1	0	Auto Door Bottom	412CPKL	Alum	Pemko
1	1	Seals	588D (36" W x 80" H)	Gray	Pemko

Hardware Set #6 Existing Stair No. 2 & 1 Door

Qty Active	Qty Inactive	Description		Finish	Mfgr.
1	0	Panic Device	ED6200A	626	Corbin Russwin
1	0	Kick Plate	10" X 2" LDW	626	BBW

Remove existing lockset and replace with panic device. Verify with Owner inside of stairway trim and

Hardware Set #7 Area of Refuge Door

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3	0	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Kickplate	10"x 2" LDW	626	BBW
1	1	Wall Stop	WC12X	626	BBW
1	1	Silencer	HM Frame mfgr.	-	-
1	0	Closer	LCN Cush-N-Stop 4114H-Cush (with 90 deg. Dead stop)	626	LCN
1	0	Panic Device	ED6200A w/ A410 passage pull side	626	Corbin Russwin
1	0	Auto Door Bottom	412CPKL	Alum	Pemko

Hardware Set #8 Corridor Doors

Qty Active	Qty Inactive	Description		Finish	Mfgr.
3	3	Hinges	FBB 179 4 ½"x 4 ½" NRP	626	Stanley
1	0	Lockset	ML2051 - NSF (office function)	626	Corbin Russwin
1	0	Kickplate	10"x 2" LDW	626	BBW
1	1	Wall Stop	WC12X	626	BBW
1	1	Silencer	HM Frame mfgr.	-	-
1	0	Closer	LCN Cush-N-Stop 4114H-Cush (with 90 deg. Dead stop)	626	LCN
0	1	Flush Bolts (#312 only)	FB51T, FB51B	626	Glynn Johnson
1	0	Astragal (#312 only)	355AS		Pemko

END OF SECTION 087100

SECTION 087160 - POWERED DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install all material and labor required for powered door operators as indicated on the drawings and as specified.

B. Provisions of Required Electrical Power:

1. For all New Construction or additions: The General Contractor shall be responsible to provide on 120v – 20A - 1φ power outlet for each door operator indicated. The outlet shall be located within six (6) feet of the strike or hinge jamb, above the transom rail of the door upon which the door operator shall be installed.

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Products specified shall be represented by a factory authorized and trained distributor who shall maintain a parts inventory and trained personnel capable of providing installation and service for the equipment.

B. Requirements of Regulatory Agencies:

1. Products shall meet the requirements of the disabled community in accordance with Federal Regulations, ANSI 117, and the requirements of the Americans with Disabilities Act (ADA) [28 CFR Parts 35 and 36].

1.3 SUBMITTALS

A. Provide manufacturers' literature and drawings showing complete elevations, detail and method of anchorage to the location, installation of hardware, size, shape and thickness of materials, joints and connections, and details of joining with other construction.

1.4 WARRANTY

A. Warranty all power operators controls, and labor provided by the powered door operator equipment installer against defects in material and workmanship at no cost to the owner for a period of two ears from date of acceptance of the installation.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering powered door operators which may be incorporated in the Work include, but are not limited to the following:

1. Horton Automatics Division, Overhead Door Corp.
2. Gyro-Tech Systems, Lanson Industries, Inc.
3. Access Technologies, The Stanley Works.
4. Dor-O-Matic Division, Republic Industries, Inc.

2.2 MATERIALS

A. General:

1. Electro-Mechanical Operated Swinging Door Units for the physically challenged as indicated on the drawings and specifications.

B. Mode of Operation:

1. Spring-close operator shall open by energized motor and shall stop by stalling motor against a mechanical stop. Door shall close slowly by means of spring energy. Closing force shall be controlled by hydraulic closer independent of the motor and electric control. Complete door cycle shall take 8 to 20 seconds. Closing speed shall be fully adjustable. Manual door operation shall require less than 12 pounds of force applied to the door stile. System shall also operator as a manual door in the event of a power failure. Hold open time shall be adjustable from 0 to 60 seconds.

C. Components:

1. Operator Housing: Operator housing shall be approximately 6" deep by 6" high by 32" long aluminum extrusion with finish end caps and shall be prepared for mounting to new or existing door frames. All structural sections shall have a minimum thickness of .166" and shall be fabricated of extruded aluminum alloy. Housing cover shall be removable to provide service access and shall be extruded form aluminum alloy to a minimum thickness of .100". Plastic covers are not acceptable. The finish of the housing and cover plate shall be available in a standard finish of Clear and Dark Bronze.
2. Power Operator: The power operator shall be fully assembled and be low energy, self-contained, electromechanical design. Gears and/or chains shall be coated with a lubricant for extreme temperature conditions. Closer to be a self-contained, sealed spring/hydraulic unit. Attached to the transmission system shall be a DC permanent magnet motor. Motor shall operate from an electronic controller and requires less than 3 amperes at full power stall. Complete unit shall be mounted with provisions for easy replacement without removing door from pivots or frame.
3. Electronic Controllers: The electronic controllers shall be 100% solid state with all electronic components required for proper operation and switching of the power operator. Mechanical type relays are not acceptable. The controller shall have time-delay, push and go circuitry, shall include sequential mode, and variable opening speed adjustment. The door's opening motion must be designed to "recycle" in the event that an obstruction is present within the passageway, causing the door to reverse direction and close automatically.

4. Connecting Hardware: The connecting drive arm shall be connected to inswing doors with a urethane covered roller, which shall ride in a track fabricated of aluminum alloy attached to the door rail where required for pull type operation. Out-wing doors shall be connected to the operator by a two-piece drive arm with self-aligning rod ends and connecting door brackets for push type operation.

2.3 ACTIVATING DEVICES

A. Wall Switches: For each power operated door opener provide one pair of surface wall mounted radio controlled transmitters; one RF receiver, mounted within the door operator house; and a pair of wall mounted switch assemblies with aluminum press plates, minimum 4" x 4", engraved with the International Symbol for wheelchair accessibility and the phrase, 'PRESS TO OPERATE" or "PRESS TO OPEN".

B. Attached surface wall mounted transmitter switch boxes to locations shown on the drawings at a height of 36" above adjacent floor or ground surface, measured to the centerline of the box. Use mechanical or adhesive fasteners adequate to provide normal use in service for devices of this type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Powered door operators and controlling devices shall be installed by factory trained installers in compliance with manufacturer's recommendations and approved shop drawings.

B. Seal around all edges of remote surface wall mounted activator switch boxes with clear silicone caulking.

C. Final plug-in connection will be provided by the contractor via an electrical pig tail provided and installed by the Contractor.

3.2 CLEANING AND PROTECTION

A. After installation, clean all surfaces of operator, controlling devices, and other construction surfaces and materials impacted by the installation of the powered door operator and controlling devices. Aluminum surfaces in contract with masonry, concrete and steel, shall be protected against direct contact by use of neoprene gaskets to prevent galvanic or corrosive action. In the case of new construction, protect the unit from damage during subsequent activities.

END OF SECTION 087160

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Glass and glazing for doors, windows and sidelites.

1.2 RELATED WORK

A. Section 079200 – Sealants & Caulking.

B. Section 081416 - Wood Doors.

C. Section 103800- Toilet and Bath Accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers:

1. PPG Industries, Inc.
2. Libby – Owens – Ford Co.
3. Ford Glass Division

B. Substitutions: Items of same function and performance are acceptable in conformance with Section 1600- Substitutions.

2.2 GLASS

A. G-1: Clear tempered glass, ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3; 1/4 inch thick.

B. G-2: ¼" clear. Monolithic Vision Lite.

C. Bathroom Mirror glass, float glass, Type 1, Class 1, Quality q2 (ASTM C1036), with silvering, copper coating, and organic protective coating, FS DD-M-411.

2.3 GLAZING MATERIALS: As required to supplement the accessories furnished with the items to be glazed and as required for a complete installation.

A. Setting Blocks: ASTM C864.

B. Spacers: ASTM C864.

C. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel with stops.

D. Glazing Clips: Galvanized steel spring wire designed to hold glass in channel without stops.

E. Sealing Tapes: Semi solid polymeric material, pressure sensitive adhesion withstanding exposure to sunlight, moisture, heat, cold and aging.

F. Glazing Gaskets: ASTM C684.

G. Glazing Compound: ASTM C669.

H. Glazing Sealants: ASTM C920, silicone, neutral cure.

I. Mirror Adhesive: As approved by mirror manufacturer, and compatible with silvering.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare glazing surfaces in accordance with sealant manufacturer's recommendations.

B. Verify compatibility of components used.

C. Clean and dry glazing surfaces.

D. Glaze in accordance with recommendations of the manufacturers of the respective items.

E. Glass shall not rest on or touch any metal member.

3.2 PROTECTION AND CLEANING

A. Protect glass from breakage after installation. Do not apply markers to surface of glass. Remove non-permanent labels and clean surfaces. Trim and remove excess glazing materials form finish surfaces, stops and frames.

B. Remove and replace glass which is broken, chipped, cracked or otherwise damaged during the construction period, including accidents and vandalism.

C. Wash and polish glass on both faces not more than four days prior to date of substantial completion.

END OF SECTION 088000

SECTION 091200 - CEILING SUSPENSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Access Doors: Section 083113.

B. Gypsum Board: Section 092900.

1.2 QUALITY ASSURANCE

A. Allowable Tolerances:

1. Deflection: Not to exceed a maximum of L/360 of span.
2. Level: Finished suspended ceilings shall not deviate from level in excess of 1/8 inch in 12 feet.

B. Testing Laboratory: The testing laboratory will perform tests on expansion devices in accordance with UBC Standard No. 47-18.

C. Seismic Restraint:

1. Work shall be in conformance to seismic restraint criteria as defined in 2006 International Building Code.

1.3 SUBMITTALS

A. Samples of suspension system components.

B. Shop Drawings, including:

1. Layout of suspension systems, location of hangers, seismic braces, and trapezes.
2. Insert and hanger spacing and fastening details.
3. Trapeze details.
4. Splicing method for main and cross runners.
5. Support at ceiling fixtures and air diffusers.
6. Change in level details.
7. Locations and dimensions of access doors, light fixtures, supply and exhaust grilles and diffusers, sprinkler heads, speakers, detection devices and all other items to be installed in suspended acoustical ceilings or any ceiling with a tile or panel pattern.
8. Acoustical unit support at ceiling fixtures.
9. Develop and coordinate location of all work which is to be located in ceiling with the sections involved prior to making Shop Drawing submittal.
10. Seismic restraint details in conformance to 2006 International Building Code.

C. Product Data: Manufacturer's information on materials, fabrication, and installation.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Store materials indoors, off the ground, and away from moisture and large variations in temperature.

B. Follow additional delivery, storage, and handling requirements of the manufacturer.

1.5 JOB CONDITIONS

A. Work which will be concealed by suspended ceilings shall be complete, tested if required, and inspected and approved prior to commencement of installation of materials specified herein.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural characteristics shall meet or exceed those of referenced standards.

1. Channels: 16-gage galvanized steel, 3/4-inch furring channels, and 1-1/2 inch runner channels, rust inhibitive finish.
2. Metal Furring: Roll formed 25-gage galvanized steel, hat-shaped channels, 2-5/8 inches wide and 7/8 inch deep, with 1/2 inch flanges.
3. Clips: 16-gage galvanized steel, of sizes and shapes shown.

B. Fasteners: To suit stud, track, or channel gage.

1. Sheet Metal Screws:

a. 3/8 inch Type S pan head for fastening 24-gage material.
b. No. 10-16 by 5/8 inch Phillips Pan Head TEKS/3 for connecting 16-gage to 16-gage metal.
c. No. 10-16 by 1/2 inch Phillips Pan Head TEKS/2 for connecting 20-gage to 20-gage metal.

2. Expansion Bolts: Federal Specification FF-B-588 or FS-S-325, Group II, Type 1 or 2. Lead, fiber, or plastic shields are not acceptable.
3. Drilled in Anchors: Steel, zinc coated (galvanized) manufacturer's standard items, designed to support twice the hanger loads imposed.

C. Wire:

1. 16-gage soft-annealed galvanized steel tie wire.
2. 12-gage soft-annealed galvanized steel hanger wire.
3. 10-gage soft-annealed galvanized steel hanger wire.
4. 8-gage soft annealed galvanized steel hanger wire.

D. Welding Electrodes: AWS, low hydrogen type, as required.

E. Miscellaneous Accessories: Manufacturer's standard, suitable for the use intended.

F. Suspension System for Acoustical Ceiling:

1. Suspension System: Non-rated, intermediate duty system complying with ASTM C 635.

   a. General: All components shall be products of the same manufacturer.
   b. Type: Exposed, 15/16-inch face grid system and suitable for use with 24-inch x 24-inch or 24-inch x 48-inch acoustical panels. Components shall be reversible, relocatable, and reusable.
   c. Perimeter Molding and Corner Caps and Pieces: Same material as that of suspension system (16-gage at fixed side of corridors) with hemmed edge.
   d. Hanger Wires and Ties: Galvanized, soft-annealed, mild steel wire, of sizes and specified or required by ASTM C 636.
   e. Miscellaneous Accessories: Manufacturer's standard for use with suspension system furnished; furnish as required.
   f. Finish: Manufacturer's standard white, low gloss paint.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that surfaces to receive materials are satisfactory for their installation. If unsatisfactory conditions exist, do not commence installation until such conditions have been corrected.

3.2 INSTALLATION

A. Gypsum Board or Portland Cement Plaster Ceiling Suspension Systems:

1. Hanger Wires:

   a. Provide 8-gage hanger wires at 4-foot centers. Tie with minimum three (3) tight turns. Cut excess wire at ends.
   b. At Concrete: Attach with drilled-in expansion anchors.

2. Maintain 6-inch minimum clearance between all wires and unbraced ducts, pipes, and conduit.
3. Space runner channels at 4-foot centers maximum; saddle-tie to hanger wire with two (2) loops secured with no less than three (3) turns.
4. Locate one runner channel within 8 inches of parallel partition where metal furring not continuous through partition.
5. Support runner channel with hanger wire 8 inches or 1/4 length of end span maximum from end of channel.
6. Splice main runners by lapping and interlocking flanges 12 inches minimum. Tie near each with double loops of 16-gage wire.
7. Space metal furring at 16-inch centers; saddle-tie with 16-gage tie wire to runner channels with tie wire and with no less than three (3) turns.
8. Splice metal furring by lapping and interlocking 8 inches minimum. Tie near each end with double loops of 16-gage wire.
9. Form vertical ceiling sections as shown and as required.
10. Provide framing as required for access doors for installation as specified in Section 08305.

B. Acoustical Ceiling Suspension Systems: Install in accordance with the requirements of ASTM C 636, the manufacturer's instructions, and reviewed Shop Drawings.

1. Hangers:

   a. Space hanger wires at 4 feet maximum centers.
   b. Connect to concrete slab with approved attachment devices with three (3) turns in 1-1/2 inches maximum. Powder driven fasteners are not allowed.
   c. Level ceiling grid and tie hanger wires with three (3) tight turns. Hanger wires shall be vertical and taut. Wires shall not be kinked to level the ceiling.
   d. Cut off tail ends of hanger wires.

2. Do not hang from non-structural elements. Provide intermediate supports or trapeze to attach hanger wires where obstructions or interferences occur.
3. Support light fixtures and HVAC diffusers and grilles independently of the ceiling grid.

C. Prior to installation of acoustical materials:

1. Remove and replace suspension system components that have been damaged or improperly installed.
2. Clean suspension system of dirt, grease, and other foreign matter.

END OF SECTION 091200

SECTION 092216 - METAL STUD SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work as evident on the drawings and specified herein or required to furnish and install non-load bearing steel stud framing for interior partitions and furring (metal studs).

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 054000: Cold Formed Metal Framing.

B. Section 072100: Building Insulation.

C. Section 079200: Sealants and Caulking.

D. Section 092900: Gypsum Wallboard Systems.

1.3 CODES AND STANDARDS

A. Comply with the provisions of the following codes and standards, except where more stringent requirements are shown or specified:

1. "International Building Code 2006".
2. ICBO "Research Committee Recommendation Reports".
3. AISI "Specification for the Design of Cold-Formed Steel Structural Members" and including the "Commentary" and "Supplements" thereto as issued.
4. AWS D1.1 "Structural Welding Code".
5. Check fire code assembly schedule for particular requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off the ground and protect steel members and packaged materials from erosion and deterioration.

PART 2 - PRODUCTS

2.1 BEARING AND NON-LOAD BEARING STEEL STUDS (METAL STUDS)

A. Non-load bearing framing for use in interior partitions and furring for metal stud and gypsum wallboard partitions.

B. Provide 16 Ga. Steel studs where extra heavy hems such as casework, handrails, toilet accessories are to be supported by the wall.

C. Studs and Runners (Track):

1. Use ASTM A525 steel, minimum 20 gauge.
2. Runners same gauge as studs.

D. Furring Channels:

1. Rigid furring channels, hat shaped: ASTM C645.
2. Rolled Steel Channels: ASTM C754, cold rolled; or ASTM C841, cold rolled.

E. Fasteners, Clips, and Accessories:

1. ASTM C754, except as otherwise specified.
2. Clips: ASTM C841, manufacturer's standard items. Clips shall have same holding power as provided by tie wire for the specific application.
3. Tie Wire and Hanger Wire: ASTM C641, soft temper, Class 1 coating. Gauge shall be as specified in ASTM C754 or ASTM C841.
4. Use of powder actuated fasteners is prohibited.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: As indicated on Drawings.
2. Minimum Base-Metal Thickness and stud depth, 1-5/8" flange, see below:

Commercial / Educational / Industrial

Nomenclature	SSMA Stud Designation	Metal Gauge	Minimum Metal Thickness
1-5/8" Metal Stud	165S125-33	20 GA	0.0329" or 1/32" +/-
2-1/2" Metal Stud	250S125-30	20 GA	0.0329" or 1/32" +/-
3-5/8" Metal Stud	358S125-30	20 GA	0.0329" or 1/32" +/-
6" Metal Stud	600S125-30	20 GA	0.0329" or 1/32" +/-
8" Metal Stud	800S125-43	18 GA	0.050 or 1/16" +/-

SSMA = Steel Stud Manufactures Association ICBO ER-4943P

Notes:

Metal Studs: Materials and installation shall comply with ASTM C645, ASTM C754, and Section 092216, non-structural metal framing. (Structural framing and other work with cold formed metal studs is specified in Section 054000 and detailed elsewhere in the contract documents.)

Install bridging as indicated at door openings in all partitions. Metals stud partitions and furring with facing on one side only, or less than full height on either (or both) sides of studs shall have bridging at maximum 5 feet on center. All partitions over 10 feet in height shall have bridging at maximum 5 feet on center.

Minimum properties for metal studs shall conform to steel stud manufacturers association stud designations as indicated in table below. Provide special size or thickness where indicated on drawings.

Contractor shall provide 6 or 8 inch studs or furring at all partitions as required to conceal structural elements; mechanical, plumbing and electrical work; and recess mounted equipment, fixtures, and accessories.

Refer to standard installation details.

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

   a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   b. Products: Subject to compliance with requirements, provide one of the following:

      1) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
      2) Superior Metal Trim; Superior Flex Track System (SFT).

PART 3 - EXECUTION

3.1 FRAMING

A. Studs shall be spaced 24 inches on center unless noted otherwise. Studs shall be installed at external corners, partition ends, and approximately 2 inches each side of internal corners.

B. The floor and ceiling runner shall be firmly secured in place at not more than 24 inch centers.

1. Provide slip track where top runner abuts floor or roof construction.
2. Set floor runner in a bead of acoustic sealant as specified in Section 079200.
3. Turn up ends of floor runners 8" at door jambs and fasten to jamb studs with minimum two (2) screws each side.

C. The studs shall be attached to the runner tracks by welding, or screws. The studs at both sides of doorways shall be doubled, screwed together, and braced within the head of door openings by a section of runner channel securely attached to the studs.

D. Studs adjoining existing concrete walls or columns shall be fastened near the top and bottom, and at least one intermediate point, in no case more than 5 feet on centers, with wire inserts, dove-tail anchors, toggle bolts, or bolts set in expansion shields.

E. Provide minimum 20 ga. double studs at door jambs.

F. A 3/4 inch cold rolled channel reinforcement shall be placed inside the partition 6 to 8 inches above door openings, shall extend continuously through two stud spaces on each side of jambs, and shall be secured to the flange of each stud by tie wire saddle-tied or by welding.

G. Frame openings for ducts and other penetrations. Coordinate with work of other trades.

H. Provide backing or blocking for wall mounted casework, shelving and accessories.

I. Provide backing at partitions adjoining walls for installation of wall mounted door stops.

3.2 CONNECTIONS

A. Connections and attachments of similar members and components shall be done by welding, or screwing. Dissimilar members and components shall be attached by welding, screw attaching, bolting or wire tying.

3.3 SPLICES

A. Splices shall not be allowed in vertical framing members.

3.4 BRIDGING

A. Refer drawings for bridging information.

B. Bridging shall be securely attached to each stud by welding or wire tying.

3.5 FIELD WELDING: NOT ALLOWED

END OF SECTION 092216

SECTION 092900 - GYPSUM WALLBOARD SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Gypsum board.

B. Tile Backerboard – water resistant glass mat board

C. Taped and sanded joint treatment.

1.2 RELATED WORK

A. Section 054000: Cold Formed Metal Framing

B. Section 079200: Sealants and Caulking

C. Section 072100: Building Insulation

D. Section 092216: Metal Studs Support Systems

E. Section 091200: Ceiling Suspension Systems

F. Section 093000: Ceramic Tile

G. Section 099419: Painting

1.3 REFERENCES

A. ASTM C475 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

B. ASTM C840 Standard Specification for Application and Finishing of gypsum Board.

C. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

D. C1047 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

E. ASTM C1396 Standard Specification for Gypsum Board

F. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

G. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.

H. Gypsum Association GA-214 M – Recommended Levels of Gypsum Board Finish.

I. Gypsum Association GA-216 – Application and Finishing of Gypsum Board.

J. Gypsum Association GA-600 – Fire Resistance Design Manual.

K. UL – Fire Resistance Directory.

L. WH (Warnock Hersey / ETL SEMKO Division of Intertek Group) – Certification Listings.

1.4 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Rated systems in accordance with Underwriters Laboratories (UL) Fire Resistance Directory.

1.5 QUALITY ASSURANCE

A. Perform gypsum wallboard systems work in accordance with recommendations of GA 214 M, GA 216, GA 253 and GA 600, unless otherwise specified in this section.

B. Keep copy of GA 214 M, GA 216, GA 253, GA 600, and USG Handbook in field office for duration of project.

C. Notify the Owner 48 hours prior to the application of any finish materials, failure to notify can result in the rejection of the gypsum wallboard system.

1.6 SUBMITTALS

A. Submit manufacturer's data, product data, and installation instructions.

B. Submit for approval two 2' x 2' finished and painted gypsum panels. Architect will review for texture only.

1.7 BACKERBOARD LIMITATIONS

A. Apply tile or solid surface panels only to gray side of DensShield panels.

B. Do not install waterproof membrane directly behind DensShield panels.

C. Do not use DensShield panels as a base for nailing and mechanical fastening

PART 2 - PRODUCTS

2.1 GYPSUM WALLBOARD

A. ASTM C36, 5/8 inch thick, tapered edges.

B. Fire Rated Gypsum Board: ASTM C36, Type X, 5/8 inch thick, unless noted otherwise, tapered edges.

2.2 TILE BACKERBOARD (DensShield)

A. Basis of Design Product Description Essential Characteristics: 5/8" Denshield Fireguard Type X Tile Backerboard (4'x8')

B. Composition: ASTM D3273, Water-resistant treated core with glass mat moisture protectant coating and glass mats, both sides. The face side is surfaced with heat-cured copolymer water resistant coating.

C. Alternative products shall be considered provided alternative product have the essential characteristics meeting basis of design as Approved equal / determined by the Architect.

2.3 GYPSUM WALLBOARD ACCESSORIES

A. Provide gypsum wallboard accessories in accordance with GA 216. Flanges minimum 7/8 inch with punchouts or deformations to provide compound bond.

B. Corner Beads: Metal.

C. Edge Trim: Metal U exposed reveal bead.

D. Control Joints: Metal - one piece.

E. Reinforcing Tape, Joint Compound, Adhesive, Water, Fasteners: GA 216.

2.4 BACKERBOARD ACCESSORIES

A. Trim: Sheet steel, galvanized.

B. Wood framing fasteners:

1. Nails: 11-gauge galvanized nails with 7/16" head, hot dipped.

2. Screws: Type W or Type S, Hi-Lo, bugle head, rust resistant.

C. Metal framing fasteners:

1. Screws: Light-gauge metal framing – Type S, bugle or wafer head, self-tapping, rust resistant. Heavy-gauge metal framing – type S-12, bugle or wafer head, rust resistant.

2.05 BACKERBOARD JOINT TREATMENT MATERIALS (DensShield):

A. Joint tape: 2" wide `10 x 10 glass mesh tape.

B. Reinforcing fabric: balanced, alkali-resistant, open-weave, glass fiber fabric, made from continuous multi-end strands with tensile strength of not less than 120 lbs. and 140 lbs. in warp and fill directions, respectively, per ASTM D 1682 and complying with ASTM D 578, and of 4.30 oz./sq. yd. minimum weight.

C. Setting-type joint compound: Untiled, non-wet areas: ToughRock setting compounds.

D. Tile setting material: Mastic or mortars, organic adhesive ANSI A136.1, dry set ANSI A136.1, dry set ANSI A118.1, latex Portland cement mortar ANSI A118.4

PART 3 - EXECUTION

3.1 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with recommendations of GA 241, GA 216, GA 253, and GA 600 as applicable.

1. Use floating corner construction at intersection of walls and ceiling and walls.
2. Panels shall be continuous over openings. Extend one (1) stud space beyond opening edge.

B. Erect single layer fire rated gypsum board horizontally, with edges and ends occurring over firm bearing at studs. Stagger vertical joints one half panel length.

C. Use screws when fastening gypsum board to metal furring or framing.

D. Place control joints to be consistent with lines of building spaces and in consistent pattern and as directed by Owner - max. spacing of control joints as follows:

1. Partition - interior, 30 feet
2. Ceiling - interior, without perimeter relief, 30 feet

E. Wall stud framing shall be doubled up behind expansion joint.

F. Place corner beads at all external corners. Use longest practical lengths. Place edge trim and provide caulk joints where gypsum board abutts dissimilar materials. Mechanically fasten with staples at 9" O.L. max.

G. Finish all edges abutting dissimilar materials with casing bead or "U" exposed reveal bead.

H. Tape, fill and sand exposed joints, edges, corners, openings, and fixings, to produce surface ready to receive surface finishes, as detailed on the drawings. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

I. Install one coat primer sealer prior to texturing.

J. Remove and re-do defective work.

3.2 TILE BACKERBOARD PANELS (DensShield)

A. Wall installations:

1. On walls behind tile locations, install panels vertically or horizontally. Install tile backer in accordance with manufacturer's recommendations and TCA Handbook for Ceramic tile Installation, method W245 and C311

B. Finishing:

1. Substrate for tile – Apply glass mesh joint tape over joints. Embed tape in setting material indicated for specified tile finishes. Allow joints to dry prior to installing tile systems.

2. Substrate for paint and wall coverings, dry areas (untiled) – Apply glass mesh joint tape over joints. Embed tape in setting-type joint compound specified. Apply skim coat of setting-type joint compound over surface of tile backer for smooth finish.

3. Substrate for high-humidity finish systems (untiled) – Apply 6" wide reinforcing fabric over joints. Embed fabric in ground coat. Skim-coat tile backer surface with ground coat for smooth finish. Apply in accordance with finish coat manufacturer's instructions.

4. Substrate for wet area, water reducible epoxy coating finish (untiled) – Apply 6" wide reinforcing fabric over joints. Embed fabric in ground coat. Skim-coat with ground coat and compatible primer. Apply epoxy coatings specified as finishing step with epoxy coating system specified.

3.3 JOINT TREATMENT

A. Finish in accordance with GA-214 Level as noted below or as specified on drawings.

B. Level 2 in areas above ceilings, storage areas, mechanical/electrical rooms and other areas not normally open to public view.

C. Level 3 in areas to receive medium or heavy texture or where heavy grade wall coverings (ceramic tile) will be applied.

D. Level 4 in areas where final decoration is a flat paint, light texture or lightweight wall coverings.

E. Level 5 in areas where final decoration is where severe lighting conditions exist are areas that are to receive gloss, semi-gloss enamel or not textured flat paints.

3.4 TEXTURE FINISH

A. Apply one coat primer/sealer as specified in Section 099419 prior to texturing gypsum board.

B. Apply finish texture coating in accordance with manufacturer's instructions.

1. Texture:

a. General Use: Light skip trowel on walls on ceilings or as indicated on drawings.

2. Prepare mock-up review prior to texturing. Include minimum 8 foot by 8 foot wall surface and adjacent 8 foot by 2 foot soffit or ceiling.
3. Apply texture coating sealer and 2 coats of paint as specified.
4. Proceed with application of texture when mock-up has been reviewed and is acceptable to the Construction Administrator.

3.5 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 092900

SECTION 093000 - CERAMIC TILE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Thin set ceramic tile floor, sanitary base, and wall finishes.

1.2 RELATED WORK

A. Section 092900 - Gypsum Wallboard Systems.

1.3 QUALITY ASSURANCE

A. Conform to ANSI - American National Standard Specifications for the Installation of Ceramic Tile.

B. Conform to Tile Council of America (TCA) Handbook for Tile Installation.

1.4 PRODUCT DATA

A. Submit product data and installation instruction for each type of tile, adhesive and Grout.

B. Submit samples for initial color selection. Submit 12 x 12 samples of patterned floor tiles.

C. Mockup: Mount tile and grout on two plywood panels 24 x 24 inch. Illustrate color, pattern and grout joints.

1.5 CERTIFICATES

A. Submit manufacturer's certification that tile materials supplied conform to ANSI A 137.1

1.6 MAINTENANCE DATA

A. Submit maintenance data. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mortars and grouts from freezing or overheating in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 TILE MATERIALS

A. Ceramic Floor Tile: Standard grade, all purpose unglazed porcelain ceramic mosaic, size as noted on drawings.

1. Porcelain tile shall be grade 4 or 5.
2. Style and Color: Style, color, pattern as indicated on drawings.

B. Ceramic Wall Tile: Porcelain, standard grade, nominal, glazed plain face, cushion edge, size as noted on drawings.

1. Provide matching trim shapes.
2. Colors shall be per room Finish Schedule, pattern as indicated on drawings.

2.2 MORTAR

A. ANSI A 118.1 dry set Portland cement, sand, water.

B. ANSI A 118.4 latex Portland cement mortar.

2.3 GROUT TYPE

A. Grout: Epoxy grout, inorganic pigments, color to be selected; resistant to shrinking. Refer to drawings.

2.4 MEMBRANES

A. Crack Isolation Membrane; Noble Company or equal, NobleSeal CIS, floor installation, meets ASTM C 627, ANSI A118.12, a composite sheet membrane manufactured from chlorinated polyethylene (CPE), with polyester fabric laminated to both sides to both sides.

B. Waterproofing membrane, Noble Company or equal, NobleSeal TS, floor and wall installation, meets ANSI A118.12 and listed by IAPMO (File #4339), composite sheet membrane manufactured from chlorinated polyethylene (CPE), with polyester fabric laminated to both sides, minimum nominal thickness of .030 inch.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Examine substrates and confirm surfaces are ready to receive ceramic tile work.

B. Repair defects with patching compound approved by mortar and adhesive manufacturers.

C. Remove curing compounds and smooth trowel finish from slabs with self-contained blast cleaning, chipping, or grinding. Use of solvents is not allowed.

3.2 INSTALLATION

A. Install ceramic wall in accordance with TCI System W 244, thin-set dry set, or Portland cement latex mortar, with waterproofing sheet.

B. Install ceramic tile floor in accordance with TCA system F122. Thin set Portland cement mortar over waterproof membrane and crack isolation membrane.

C. Cut and fit tile tight to protrusions and vertical interruptions. Form corners and bases neatly.

D. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Joints; Watertight, without voids, cracks, excess mortar, or grout.

E. Sound tile after setting. Replace hollow sounding units.

F. Allow tile to set for a minimum of 48 hours prior to grouting.

G. Seal floor to wall tile joint with sealant specified in Section 07900. Do not grout.

3.3 PROTECTION

A. Prohibit traffic from floor finish for 48 hours after installation.

B. Seal grout in accordance with manufacturer's instruction.

C. Cover floors with reinforced Kraft paper. Lap and tape joints.

3.4 REPLACEMENT MATERIALS

A. When work is completed, deliver stock of replacement material to the Owner. Furnish full size units, matching the material installed, packaged and marked for identification.

1. Furnish not less than 1% of the total amount to ceramic floor tile installed, but in no case less than one full box of each type and color.

3.5 MAINTENANCE INSTRUCTIONS

A. Submit maintenance instructions and list of recommended maintenance materials.

END OF SECTION 093000

SECTION 095123 - ACOUSTICAL TREATMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Work as evident on drawings and specified herein or required to furnish and install non-rated acoustical panel ceilings.

B. Ceiling Suspension System.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's specifications and installation instructions for each acoustic unit and metal ceiling panel required, including certified laboratory test reports and other data as required to show compliance with these specifications.

B. Samples: Submit samples for each acoustic tile. Each set of samples shall show the full range of exposed color and texture to be expected in the completed work. Sample submittal and Architect's review will be for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.3 JOB CONDITIONS

A. Do not install acoustic products until installation areas meet the following requirements:

1. Exterior openings have been closed and roofs are weathertight.
2. Mechanical, electrical, and other work above ceilings has been completed.
3. Wet work has been installed.

B. Do not proceed with the acoustic work until unsatisfactory conditions have been corrected in an acceptable manner.

1.4 DELIVERY AND STORAGE

A. Deliver products to project site in original unopened packages, bearing manufacturer's name, and labeled to identify each type of acoustic unit.

B. Store in a manner to protect materials from damage due to weather or construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers are:

1. Armstrong World Industries
2. USG Interiors

B. Substitutions: Items of suitable function and performance are acceptable in conformance with Section 160000 – Substitutions.

2.2 ACOUSTICAL UNITS

A. Acoustical units shall be manufacturer's standard mineral fiber tile with factory-applied finish color selected from manufacturer's standard colors conforming to the following requirements.

1. Surface Texture: Fine.
2. Composition: Mineral Fiber.
3. Color: White.
4. Size: 48 inches by 24 inches by 3/4 inch.
5. Edge Profile: Beveled Tegular for interface with compatible Armstrong grid.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.65.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton 35.
8. Emissions Testing: Section 01350 Protocol,<13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62. 1-2004, "Ventilation for Acceptable Indoor Air Quality".
9. Flame Spread: ASTM E 1264; Class A (UL).
10. Light Reflective (LR): ASTM E 1477; White Panel: light Reflectance 0.85.
11. Dimensional Stability: Standard – Space is enclosed, weatherproofed, HVAC systems operating.
12. Antimicrobial Protection: BioBlock Plus – Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
13. Acceptable Product: Cirrus Second Look, 510 as manufactured by Armstrong World Industries.

B. Lay-In Panels:

1. Refer to drawings for material finish legend.

2.3 SUSPENSION SYSTEMS

A. Type and Manufacture: Acoustical tile system: Indirect Hung, Intermediate Duty, conforming to ASTM C-636.

1. Refer to drawings for material legend.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ceiling systems in accordance with manufacturer's recommendations and ASTM C636 to produce finished ceiling true to lines and levels and free from warped, soiled or damaged grid or lay-in panels.

B. Install systems in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 span and maximum surface deviation of 1/8 inch in 10 feet.

C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work. Ensure that layout of hangers and carrying channels are located to accommodate fittings and units of equipment which are to be placed after the installation of ceiling grid system.

D. Where ducts of other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels as required to span the required distance.

E. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. If steel deck is not supplied with hanger tabs, coordinate the installation of hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.

G. Center ceiling systems on room axis leaving equal border pieces.

H. Do not support fixture from or on main runners or cross runners if weight of the fixture causes the total dead load to exceed the deflection capability. In such cases, support fixture loads by supplementary hangers located within 6 inches of each corner, or support the fixtures independently.

I. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, provide stabilizer bars.

J. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes. Where bullnose corners occur, provide preformed closers to match edge molding.

K. Form expansion joints as detailed on drawings. Form to accommodate plus or minus 1 inch movement and maintain visual closure.

L. Fit panels in place, free from damaged edges or other defects detrimental to appearance and function. Lay directionally patterned tile one way with pattern parallel to longest room axis. Fit border units neatly against abutting surfaces, or in pattern as shown on drawings.

M. Install lay-in panels level, in uniform plane and free from twist, warp and dents.

3.2 MAINTENANCE INSTRUCTIONS

A. Submit manufacturer's recommendations for cleaning and refinishing panels tile, including precautions against materials and methods which may be detrimental to finishes and acoustic efficiency.

3.3 REPLACEMENT MATERIALS

A. When work is completed, deliver stock of replacement material to the Owner. Furnish full size units, matching the material installed, packaged and marked for identification.

1. Furnish not less than 1% of the total amount of each type of acoustic panel installed, but in no case less than one full box.

3.4 CLEAN UP AND PROTECTION

A. Clean exposed surfaces of acoustic panels and any exposed systems, complying with manufacturer's instruction. Remove and replace units and members which are damaged or cannot be cleaned.

B. Ensure that minimum temperature and maximum humidity limitations and other procedures required for protection of acoustic ceilings from damage or deterioration are maintained until acceptance of the work.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Thermoplastic-rubber base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOSET-RUBBER BASE: B2

A. Roppe Corporation, 1602 N Union St., Fostoria, OH 44830. P: (800) 537 – 9527

B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:
   a. Style B, Cove:

C. Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: Selected from manufacturers standard pallet.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm)] in length.

   a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

   a. Miter or cope corners to minimize open joints.

END OF SECTION 096513

SECTION 096519 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Work as evident on drawings and specified herein or required to furnish and install complete the resilient flooring, rubber, base and accessories.

B. Resilient flooring finishes shall match existing finishes in size and color, if not available, Contractor shall provide a selection of comparable finish samples for selection and approval by the Architect.

1.2 DELIVERY AND STORAGE

A. Deliver and store materials in manufacturer's original unopened packages, clearly marked with identifying information.

1.3 JOB CONDITIONS

A. Continuously heat areas to receive flooring to 70°F for at least 48 hours prior to installation, when project conditions are such that heating is required. Maintain 70°F temperature continuously during and after installation as recommended by flooring manufacturer, but for not less than 48 hours.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION TILE

A. ASTM F1066

B. Size: 12" x 12"

C. Thickness: 1/8"

D. Design and color: As scheduled on the drawing.

2.2 RESILIENT BASE

A. Rubber base 4-inches high, 1/8-inch gauge, standard topset cove. Color as indicated on the drawings.

2.3 RESILIENT EDGE STRIP

A. Homogeneous vinyl or rubber composition, 3/32-inch thick, not less than 1-inch wide, tapered edge, color as scheduled.

2.4 CONCRETE FLOOR LEVELER

A. Ardex K-55 concrete underlayment patch, or equivalent product as acceptable to flooring manufacturer.

2.5 ADHESIVES (CEMENTS)

A. Armstrong S-575, or equivalent product as acceptable to flooring manufacturer.

B. As recommended by manufacturer for accessories.

2.6 SUBSTITUTIONS

A. Items of matching color, texture, function and performance are acceptable in conformance with Section 016000 – Substitutions.

2.7 FLOOR TRANSITION STRIP ACCESSORY

A. #155 vinyl single flange track with #154 vinyl snap-down super edge.

PART 3 - EXECUTION:

3.1 INSPECTION

A. Examine the areas and conditions under which resilient flooring and accessories are to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Verify concrete floors and dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

A. Prior to laying flooring, broom clean or vacuum surfaces to be covered and inspect subfloor. Start of flooring installation will indicate acceptance of subfloor conditions and full responsibility for completed work.

1. Floor Leveling: Prepare all floors that are to receive resilient flooring, by filling all cracks, holes, chips, unevenness and/or score marks with floor leveler as accepted by manufacturer and finish to a smooth, hard surface suitable for flooring application.
2. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with Manufacturer's directions.
3. Apply moisture test areas per Manufacturer's instructions.

3.3 INSTALLATION OF TILE FLOORING

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent when tile is placed.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

F. Install tile to basket weave pattern. Allow minimum ½ full size tile width at room or area perimeter.

G. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

H. Install resilient edge strips at unprotected or exposed edges, and where flooring terminates.

I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

J. At movable partitions, install flooring under partitions without interrupting floor pattern.

K. Install edge strips where indicated. Fit joints tightly.

3.4 INSTALLATION OF BASE AND EDGE STRIPS

A. Apply wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Layout base to minimize number of joints, with no strip less than 24 inches in length (or length of wall). Use of short pieces to save material will not be permitted. Install base with preformed outside corner units. Fabricated outside corners are not allowed. Miter or cope inside corners.

Tight bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

1. On irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended filler material. Use of adhesive is not allowed.

B. Place resilient edge strips tightly butted to flooring and secure with contact bond adhesive. Install edging strips at all unprotected edges of flooring unless otherwise shown.

3.5 CLEANING AND PROTECTION

A. Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring from damage by covering.

B. Finishing: After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories. Apply floor polish and buff, with type of polish, number coats and buffing procedures in compliance with flooring manufacturer's instructions.

C. Maintenance Instructions: Submit 2 copies of manufacturer's written instructions for recommended maintenance practices for each type of resilient flooring and accessories.

3.6 REPLACEMENT MATERIALS

A. When work is completed, deliver stock of replacement material to the Architect. Furnish material from the same lot installed, packaged and marked for identification.

1. Furnish not less than 1 carton of each, pattern and color installed.

END OF SECTION 096519

SECTION 096813 – CARPET TILE

PART 1 - GENERAL

1.1 SCOPE

A. Per each installation comply with and provide all labor, materials, equipment and services necessary to furnish and install all Carpet Tiles and related items as indicated and specified.

1.2 SUMMARY

A. This section includes the following:

1. Carpet Tiles.
2. Adhesives.
3. Related accessories.

B. Related Documents - See:

1. Section 098200 Cementitious Coatings.
2. Finish Plans: Contractor shall be responsible for all measurements. If drawings are provided, they are only to indicate spaces to receive carpeting. They are not meant to be scaled.

1.3 DEFINITIONS

A. Carpet Tile: 24" x 24" square

1. Group I - Severe or Extra Heavy Rated Commercial Tufted Tiles

B. Maintenance Materials: Additional Carpet Tiles designated for future use.

1.4 SUBMITTALS

A. General: Contractor must submit the following information in accordance with Section 013000.

1. Demonstrate that the carpet tile submitted in response to this solicitation is equal to or better than the specified criteria by completing every line of Table 2.2 under Part II Products.
2. Provide samples of carpet tiles showing the full range of colors, patterns and construction for each product being bid.

B. The successful bidder shall submit the following information upon notification of intent to award:

1. Certificates signed by the floor covering Manufacturer certifying that installers comply with requirements specified under "Quality Assurance" article.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage installer that is certified by floor covering manufacturer as competent in the installation of carpet tiles. Installer to have a minimum of five (5) continual years experience with the installation of carpet tiles.

B. Manufacturer Qualifications and Requirements: Shall be an established carpet tile manufacturer for no less than ten (10) continual years.

C. Guarantee: Submit a written guarantee, executed by the contractor, installer and manufacturer, agreeing to repair or replace units which fail in materials or workmanship.

1. Guarantee period is THREE (3) YEARS after the date of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Re-packed and re-sealed cartons must remain clearly labeled with identification of the manufacturer, brand name, quality or grade, fire hazard classifications and lot number.

B. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

C. Store re-cartoned and re-sealed products in their undamaged cartons from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground. Maintain temperature in storage area above 40 degrees Fahrenheit.

D. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

E. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

F. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

1.7 PROJECT CONDITIONS

A. Pima County shall maintain a minimum temperature of 60 degrees Fahrenheit for 48 hours prior to installation, during installation and 48 hours after installation. After this period, Pima County shall maintain a temperature of not less than 55 degrees Fahrenheit.

B. Do not install carpet tiles until they are at the same temperature as the space where they are to be installed.

C. Do not install Carpet Tiles over concrete slabs until slabs, patches and/or floated areas have cured and are sufficiently dried to bond with adhesives as determined by the floor covering manufacturer's bond and moisture test and/or as directed by Owner.

1.8 SEQUENCING AND SCHEDULING

A. Wherever possible, install carpet tiles and accessories after other finishing operations, including painting, have been completed.

1.9 EXTRA MATERIALS

A. Maintenance materials of Carpet Tiles: When product arrives it shall be separated from the shipment, checked, re-sealed and re-tagged with original labels identifying the manufacturer, brand name, quality, or grade, color, dye lot, pattern and fire hazard information. Maintenance materials will be full carpet tiles. Provide one box.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These specifications are not intended to be proprietary, but are intended to demonstrate **MINIMUM APPEARANCE, PERFORMANCE, and HEALTH and SAFETY STANDARDS** in order to be considered for acceptance.

1. Pre-Approved Manufacturers of Carpet Tiles include, but are not limited to, the following. However, all Manufacturers must still demonstrate that the product which they propose to provide in response to this solicitation has been tested as an complete assembly, and that it meets or exceeds the minimum criteria that follow.

   a. Shaw Contract, Basis of Design, Transparent Tile
   b. Mohawk Group

2. Adhesive

   a. As per Manufacturers' requirements.

3. Accessories

   a. Roppe 4" extruded rubber cove base

      1) 120 linear foot rolls
      2) Colors per Room Finish Schedule.

   b. Roppe extruded rubber threshold and reducer strips
   c. Schluter Schlene stainless steel transition profile.

4. Refer to drawings for finish material legend.

2.2 MATERIALS

A. CARPET TILES APPEARANCE CRITERIA

MINIMUM STANDARD	CRITERIA	PROPOSED
		Provide required information below and attach certified documentation
Random Multi Colored Pattern Non Directional	**STYLE**	Name of Product Line: _____ ___ Complies ___ Does not comply
Random Multi Colored W/ Minimum of Three Distinct Colors	**COLORATION**	___ Complies ___ Does not comply
Tufted Pile	**CARPET TILE CONSTRUCTION**	___Yes ___ No
Multi Level Loop		___Yes ___ No
24" x 24" tiles	**FINISHED TILE SIZE**	___ Available ___ Unavailable

B. CARPET TILE PERFORMANCE CRITERIA

MINIMUM STANDARD	CRITERIA	PROPOSED
		Provide required information below and attach certified documentation.
100% Branded and carries a Federally registered Trademark	**YARN**	Trademark Name: _____ Registration # : _____
Continuous Bulk Filament (CBF)		___ Complies ___ Does not comply
6.6 Injection Yarn Dyed Nylon OR 6.6 Solution Dyed Nylon, tested in accordance with AATCC20		*Select one of the following dying methods* ___ Injection Dyed OR ___ Solution Dyed
Crock Meter Method ≥4 rating wet or dry per AATCC 165		___ Complies ___ Does not comply
"Severe Traffic End Use" ≥3.5 ARR based upon 12,000 cycle Hexapod test per CRI TM 101	**TRAFFIC LEVEL CLASSIFICATION**	___ Complies ___ Does not comply
Hexapod Drum Test per ASTM 5252 CRI TM 101 Reference Scale Rating of ≥ 3.5 for loop pile or cut pile.	**TEXTURE RETENTION**	___ Complies ___ Does not comply
		Provide required information below and attach certified documentation. (NOT GRADED CRITERIA)
Looped Pile shall comply with GSA Spec ≥ 10 lbs	**TUFT BIND**	Looped Pile: ___Yes ___ No; If Yes... ___ Complies ___ Does not comply
Minimum Hgt of 0.125 in (3.175 mm) and a Maximum Hgt of 0.250 in (6.35 mm)	**PILE HEIGHT**	Height of level loop or cut pile _____ Height Range of multi height loop: Min _____ in Max _____ in
		Height variance of multi loop _____
Synthetic PVC Free tested in accordance with AATCC 20	**PRIMARY BACKING**	___ PVC Free ___ Contains PVC
Synthetic PVC Free tested in accordance with ASTM D 629	**SECONDARY BACKING**	___ PVC Free ___ Contains PVC

MIMIMUM STANDARD	CRITERIA	PROPOSED
		Provide required information below and attach certified documentation.
Density ≥ 18 lbs	**ATTACHED CUSHION BACKING**	___ Complies ___ Does Not comply
Aachen Test meets or exceeds GSA Spec +/- 0.15% maximum when wet	**DIMENSIONAL STABILITY**	___ Complies ___ Does Not comply
Tolerance range +/-1/32" of dimensional specifications	**SQUARENESS**	___ Complies ___ Does Not comply
Tufted Construction ≥ 3 psi per ASTM D 3936	**DELAMINATION FROM SECONDARY BACKING**	___ Complies ___ Does Not comply
Bonded/Bound per AATCC 189	**SOIL RESISTANCE**	___ Complies ___ Does Not comply
Red Dye Stain Scale rating of 8 per AATCC 175	**STAIN RESISTANCE**	___ Complies ___ Does Not comply
Minimum rating of 3 - 4 per AATCC 16E after: min 160 hrs for solution dyed yarn min 60 hrs for yarn dyed yarn	**LIGHTFASTNESS**	___ Solution Dyed ___ Yarn Dyed ___ Complies ___ Does not comply

MINIMUM STANDARD	CRITERIA	PROPOSED
		Provide required information below and attach certified documentation.
Edge Ravel: ≥ 10 Years	**ASSEMBLED PRODUCT WARRANTIES**	___ Complies ___ Does Not comply
Dimensional Stability: ≥ 10 Years		___ Complies ___ Does Not comply
Delamination: ≥ 10 Years		___ Complies ___ Does Not comply
Static Protection: ≥ 10 Years		___ Complies ___ Does Not comply
Zippering: ≥ 10 Years		___ Complies ___ Does Not comply
Cushion Resiliency: ≥ 10 Years		___ Complies ___ Does Not comply
Anti - Microbial: ≥ 10 Years		___ Complies ___ Does Not comply
Texture Retention: ≥ 10 Years		___ Complies ___ Does Not comply

C. CARPET TILE HEALTH AND SAFETY CRITERIA

MINIMUM STANDARD	CRITERIA	PROPOSED
		Provide required information below and attach certified documentation.
Inherent in both yarn and backing in accordance with AATCC 134 ≤ 3.5 kV	**STATIC CONTROL**	___ Complies ___ Does Not comply
Methenamine Pill Test CPSC FF 1-70 per ASTM D 2859 Pass / Fail	**FLAMMABILITY**	___ Pass ___ Fail
Flooring Radiant Panel Test per ASTM E 648 Class 1 ≥ 0.45 watts/sq cm		___ Complies ___ Does Not comply
NBS Smoke Chamber Test ASTM E 662 ≤ 450 Dmc in flaming mode		___ Complies ___ Does Not comply
CRI IAQ Meets "Green Label PLUS" Certification	**INDOOR AIR QUALITY**	___ Complies ___ Does Not comply
Inherent in Backing as registered with the EPA and integrated during production, not during the finishing process.	**ANTI-MICROBIAL**	___ Inherent EPA Registration # _____
Bound (chemically bonded to the fiber) in accordance with AATCC 174 & AATCC 138 guidelines demonstrating >90% reduction in bacterial growth after 24 hrs. with no visible fungal growth activity after 3 days following 15 washings.		___ Bound ___ Unbound
		___ Complies ___ Does Not comply
All components shall be recyclable into either new carpet products or other nylon-based products, or shall be capable of being refurbished to the point of rendering them "almost new" and reusable.	**RE-USABILITY / RECYCLABILITY**	Post-Consumer Re-Cycled Content = ___ %
		___ May be recycled into new products

2.3 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: See Section 098200 Cementitious Coatings.

B. Trowelable Underlayments and Patching Compounds: See Section 098200 Cementitious Coatings.

C. Accessories: Refer to Section 2.1.3 manufacturers:

1. Provide Schluter strip with appropriate butting gauge where carpet tiles meets concrete.
2. Provide rubber reducer strip with appropriate butting gauge where carpet tiles meets sheet rubber or sheet vinyl products, rubber tile or vinyl tile products.

3. Provide Schluter strip with appropriate butting gauge where carpet tiles meets ceramic tiles.
4. Where specified on schedules, provide 4" high extruded rubber cove base. No preformed corners. 120' roll goods only (no four foot pieces).

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine areas where installation of carpet tiles will occur, with installer present, to verify that substrates and conditions are satisfactory for installation and comply with floor covering manufacturer's requirements and those specified in this section. Subfloor to be free from cracks, holes, ridges, and other defects impairing performance or appearance.

B. Concrete Subfloors:

1. Slab substrates shall be dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive.

C. Do not proceed with installation until all unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive carpet tiles.

B. Clean floors of dust, dirt, solvents, oil, grease, paint, plaster and other substances detrimental to proper performance of adhesive and carpet tiles. Allow floors to dry thoroughly

C. Broom or vacuum clean substrates to be covered by carpet tiles immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation or dust.

D. Use trowelable leveling and patching compounds per floor covering manufacturer's direction to fill cracks, holes and depressions in substrates. See Section 098200 Cementitious Coatings.

E. Ensure floors are level, with maximum surface variation of 1/4" in ten (10) feet, noncumulative (on a case by case basis).

F. Ensure floors are level with a maximum surface variation of 1/8" where Carpet Tiles terminates at other flooring materials.

3.3 INSTALLATION

A. Maintain on site a copy of the Manufacturer's installation instructions. Comply with carpet manufacturer's installation instructions and other requirements indicated that are applicable to this project.

B. During new construction or remodel, sequence carpet tile installation with other work to minimize the possibility of damage and soiling during the remainder of the construction period.

C. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish floor as marked on subfloor. Use chalk or other non-permanent marking devices.

D. Following preparation spread adhesive in quantity and manner as per manufacturer's recommended installation instructions.

E. Lay carpet tiles in the direction as indicated on the back of the tiles and as per manufacturer's installation instructions.

F. Cut and fit carpet tiles neatly around projections through floor and to walls and other vertical surfaces and leaving no gaps.

G. Entire carpet tile installation is to be laid tight and flat to subfloor, presenting a uniform, pleasing appearance.

H. Insure seams are straight, not overlapped or peaked and free of gaps.

I. Cove base to be installed on walls, applying adhesive on both wall and back of base. Butt straight sections and joints tightly. Only one seam per any one wall and no section less than 18" per wall.

J. Install reducers and threshold strips in a manner limiting surface variations to a maximum of 1/8" between accessories and flooring materials. Use full pieces only. No seams are allowed within the area of a threshold.

3.4 CLEANING AND PROTECTION

A. Keep carpet tiles clean during installation. Upon completion of work, clean up dirt and debris and clean carpet of all spots with proper spot remover. Remove all loose threads with sharp scissors, then clean entire carpet installation with vacuum cleaner.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by floor covering manufacturer.

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall covering.
2. Textile wall covering.

1.2 SUBMITTALS

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

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

C. Samples: Full width by 36-inch long section of wall covering from same print run or dye lot to be used for the Work, with specified treatments. Mark top and face of fabric.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

E. Maintenance Data: For wall coverings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire-Growth Contribution: Textile wall coverings complying with acceptance criteria of UBC Standard 8-2.
3. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 265 and complying with test protocol and criteria in the 2006 IBC.

1.4 EXTRA MATERIALS

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

1. Wall-Covering Materials: For each type, full-size units equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 WALL COVERINGS

A. General: Provide rolls of each type of wall covering from same print run or dye lot.

2.2 VINYL WALL COVERING: Refer to finish schedule.

A. Vinyl Wall-Covering Standards: Provide mildew-resistant products.

2.3 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Primer/Sealer: Mildew resistant, complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall-covering manufacturer for intended substrate.

C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

C. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

E. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

F. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

G. Install strips in same order as cut from roll.

H. Install reversing every other strip.

I. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

J. Match pattern 72 inches above the finish floor.

K. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.

L. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

M. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

N. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

O. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

3.2 GYPSUM WALLBOARD TEXTURE

A. Do not texture gypsum wallboard on walls to receive VWC.

B. Wall surfaces shall be acceptable to the VWC Contractor.

END OF SECTION 097200

SECTION 098200 – CEMENTITIOUS FLOOR COATING

PART 1 - GENERAL

1.1 SCOPE

A. Per each installation comply with and provide all labor, materials, equipment and services necessary to furnish and install cementitious coatings and related items as indicated and specified.

1.2 SUMMARY

A. This section includes the following:

1. Patching substances.
2. Underlayments.

B. Related Documents:

1. Section 030500 Concrete Floor Sealer.
2. Section 096519 Resilient Flooring (vinyl composition tile)
3. Section 096813 Carpet Tile

C. Plans: Contractor shall be responsible for all measurements. Drawings are provided only to indicate spaces to receive flooring materials. They are not meant to be scaled.

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract.

B. Demonstrate that the proposed products are equal or better than the Minimum Standard Criteria by completing every line on charts 2.3 under Part II Products.

C. Certifications to be on Manufacturers' letterheads and signed by an officer of the Corporation manufacturing the product.

D. Manufacturers' installation data posted at each installation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage installer that is certified by the manufacturer as competent in the techniques of installation. Installer to have a minimum of five (5) continual years experience with the installation of cementitious products.

B. Guarantee period is THREE YEARS after the date of substantial completion per installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's name, stock number and date of manufacture.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Inspect containers upon delivery to ensure that products are undamaged and properly protected.

C. Store products at site in a manner that will facilitate inspection and measurement of quantity and counting of units.

D. Store re-sealed materials in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 50 degrees Fahrenheit. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and applying the coatings.

E. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

F. Coordinate delivery with installation time to ensure minimum holding for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other loses.

1.6 PROJECT CONDITIONS

A. Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are between 50 degrees Fahrenheit and 95 degrees Fahrenheit.

B. Do not apply coatings in snow, rain, fog or mist; when the relative humidity exceeds 85 percent; at temperatures less than 50 degrees Fahrenheit above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the coating operation.
2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and the temperature within the area can be maintained within limits specified by the manufacturer during application and drying periods.

1.7 SEQUENCING AND SCHEDULING

A. Do not install over concrete or wood floors until they are sufficiently dry to bond with cementitious materials as per the manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These requirements are not meant to be proprietary, but, are intended to be the minimum standards considered for acceptance by Pima County. Manufacturer's names are used solely for the purpose of demonstrating these minimum requirements for quality and craftsmanship:

1. Underlayments

a. Ardex
b. Mapei

2. Accessories

a. Ardex P-51 Primer
b. Ardex P082 Primer

2.2 SUBSTITUTIONS:

A. Per prior approval process – see instructions to bidders.

2.3 MATERIALS

A.

Group I	**Criteria**	**Submittal**
Ardex K-15	Self Leveling/Featheredge Underlayment	
3-4 Hours	Set Time	
ASTM C109/mod	Compressive Strength	
4100 PSI After 28 Days		
16 Hours	Installation of Standard Floor Coverings	
ASTM C191, 30 Minutes @ 70 Degrees Fahrenheit	Initial Set	
ASTM C191 2 Hours @ 70 Degrees Fahrenheit	Final Set	
ASTM C348	Flexural Strength	
1000 PSI After 28 Days		
ASTM E-84-81a Multi	Flammability	
0	Flame Spread	
0	Fuel contribution	
0	Smoke Development	
10 lb Bag Covers 60 sq.ft., 1/8" Thick and 30 sq.ft., 1/4" Thick	Coverage	
From Featheredge Neat to 1-1/2" Thick	Featheredge Range	
Concrete, wooden floors, cut back adhesives, ceramic tile, terrazzo, metal deck	Compatibility	
ASTM-C 150 Portland Cement Based Inorganic Binder Content 100%	Cement Binder Content	

2.4 SPECIAL COATING MATERIALS -- GENERAL

A. Material Compatibility: Fillers, primers, finish coat material, and related materials that are compatible with one another and the substrates indicated under conditions of service and application as demonstrated by the manufacturer based on testing and field experience.

2.5 INSTALLATION ACCESSORIES

A. Ardex P-51 Primer or equal for use on old and new concrete floors.

B. Ardex P-82 Primer or equal for use on terrazzo, quarry tile, ceramic tile, metal, epoxy flooring systems, hardwood or plywood and cut back adhesives.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which coatings will be applied for compliance with manufacturer's requirements on applying coatings. Surfaces to receive coatings must be thoroughly dry before coatings are applied.

1. Do not proceed with coating application until unsatisfactory conditions have been corrected.
2. Start of application will be construed as the applicator's acceptance of surfaces within that particular area.

B. Coordinating Work: Review sections in which other coatings are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on the characteristics of specified finish materials to ensure compatible primers.

1. Notify the Architect of problems anticipated using the coatings specified.

3.2 PREPARATION

A. Remove the top layer, patches and other curing compounds that are loose, flaking, cracked or otherwise compromised and that may act as a bond breaker and/or affect the performance of the underlayment.

B. All subfloors, regardless of material, must be solid, sound, thoroughly cleaned and properly primed.

C. All subfloors must be of adequate strength, clean, and free of all oil, grease, dirt, curing compounds, and any substance which might act as a bond breaker. Mechanically clean, if necessary, using shot-blasting or other. Acid etching or the use of solvents is not acceptable.

D. Cutback and other adhesive residues must be thin, solid and well bonded to the subfloor.

E. All cracks in the subfloor shall be repaired to minimize telegraphing through the underlayment.

F. Subfloors shall be inspected and corrected for moisture or any other conditions which could affect the performance of the underlayment or finished floor covering.

3.3 INSTALLATION

A. Maintain on site a copy of the manufacturers' installation instructions. Comply with manufacturer's installation instructions and other requirements indicated that are applicable to this project.

B. During new construction or remodel, sequence installation with other work to minimize the possibility of damage and soiling during the remainder of the construction period.

C. Maintain reference markers, holes or openings that are in place or plainly marked.

D. Apply cementitious materials by brush, roller, spray, squeegee, or other applicators according to the manufacturer's installation instructions. Use brushes best suited for the material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool only if recommended by the manufacturer for the material and to achieve a smooth surface.

1. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions detrimental to forming a durable coating film.
2. Provide finish coats compatible with the primers used.
3. The number of coats and film thickness required is the same regardless of the application method. If necessary, do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Where sanding is required, according to the manufacturer's directions, sand between applications to produce a smooth, even surface.
4. Observe the basic rules of concrete work. Do not install below 50 degrees Fahrenheit surface temperature. Install quickly if floor is warm and follow hot weather precautions.
5. Surface shall be true to plane within 1/4" maximum gap under a 10 foot edge in any direction in accordance with ACI 302.1, R-89 flatness tolerance (on a case by case basis).

E. Priming

1. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to the material required to be coated or finished that has not been prime-coated by others.

   a. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

2. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections.
3. Prime with Ardex P-51 primer or Ardex P-82 primer whichever is appropriate for the particular application as directed by the manufacturer's installation instructions.
4. Mechanical Applications: Use mechanical methods to apply coating as per the manufacturer's installation instructions.

   a. Wherever using spray application, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass, unless recommended by the manufacturer

5. When undercoats or other conditions show through the final coat, apply additional coats until the cured film has a uniform coating finish, color and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.

6. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

    a. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces.
    b. Coat the back sides of access panels, removable or hinged covers and similar hinged items to match exposed surfaces.
    c. Omit primer on metal surfaces that have been shop-primed and touch-up painted

F. Patching

1. Use patching compound as a filler for any areas over 1/4” deep. (Surface texture is rougher and not acceptable as a finished texture.) Apply following manufacturer’s recommendations.
2. Apply finish coat of self-leveling material over patch and not to exceed 1/4” thickness. Apply as per manufacturer’s recommendations.
3. By definition a patch shall not exceed an area 4’ x 4’ or 16 square feet.

G. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pre-treated, or otherwise prepared for coating and/or patched as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient drying time between successive coats. Do not recoat until the coating has dried so it feels firm and does not deform or feel sticky under moderate thumb pressure and where applying another coat does not cause the undercoat to lift or lose adhesion.

H. Application Procedures: Apply coatings by brush, roller, spray or other applicators according to the manufacturer’s installation instructions.

1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep’s wool as per the manufacturer's installation instructions for the material and texture required.
3. Spray Equipment: Use spray equipment with orifice size as per the manufacturer's installation instructions for the material and texture required.

I. Minimum Coating Thickness: Apply each material no thinner than the manufacturer’s recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

3.4 CLEANING AND PROTECTION

A. Clean-up: At the end of each work day, remove rubbish, empty cans, rags and other discarded materials from the site. All project debris shall be removed by flooring Contractor to Contractor’s trash container. Use of County trash containers is not permitted.

1. After completing work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing and recoating as acceptable to the Architect. Leave in an undamaged condition.

1. Provide "Wet Floor" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.
2. At completion of other trades' construction activities, touch up and restore damaged or defaced coated surfaces.

C. Supply brown paper at least 4 feet wide.

1. Lay paper over newly completed areas in corridors.
2. Lay paper over partially demolished areas to prevent tracking of and spread of dust and debris.

END OF SECTION 098200

SECTION 098439 - ACOUSTICAL CEILING CLOUDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical clouds
2. Attachment hangers and fasteners

B. Related Sections:

1. Section 09 51 23 – Acoustical Ceilings
2. Division 23 (15) Sections - HVAC
3. Division 26 (16) Sections - Electrical

C. Substitutions:

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not neccessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

B. International Building Code

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of cloud system required.

B. Installation Instructions: Submit manufacturer's installation instructions.

C. Shop Drawings: Layout and details of acoustical clouds. Show locations of items which are to be coordinated with acoustical clouds.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical clouds and method of attachment by a single manufacturer.

B. Coordination of Work: Coordinate acoustical cloud work with installers of related work including, but not limited to suspended ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

C. Seismic Performance: The International Building Code allows architectural components to swing freely as long as they will not be damaged or cause damage. Soundscapes Shapes Acoustical Clouds suspended individually with aircraft cable will swing no more than 18 inches in any direction for each panel. Shapes direct attached to drywall or suspended in group systems have been engineered for application in all seismic areas.

D. Acoustical acoustical clouds, as with other architectural features located in the ceiling plane, may obstruct or skew the existing or planned fire sprinkler water distribution pattern, or possibly delay the activation of the fire sprinkler or fire detection system. Designers and installers are advised to consult a fire protection engineer, NFPA 13, and their local codes for guidance on the proper installation techniques where fire detection or suppression systems are present.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical clouds to project site in original, unopened packages and store them in a fully enclosed space between 40°F (4° C) and 120°F (49° C) where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. All wet work (plastering, concrete, etc) must be complete and dry.

B. Before installing acoustical clouds, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical clouds carefully to avoid damaging the surface and edges in any way.

1.6 PROJECT CONDITIONS

A. Space Enclosure: Building areas to receive acoustical clouds shall be free of construction dust and debris. Products can be installed in temperatures between 40°F (4° C) and 120°F (49° C). Cannot be used in exterior applications, where standing water is present, or where moisture will come in direct contact with the acoustical cloud.

1.7 WARRANTY

A. Acoustical Clouds: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical clouds that fail within the warranty period. Failures include, but are not limited to:

1. Acoustical clouds: Manufacturing defects.
2. Attachment devices: Rusting and manufacturing defects.

B. Warranty Period:

1. Acoustical Clouds: One (1) year from date of substantial completion.
2. Attachment devices: One (1) year from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acoustical Clouds:

1. Armstrong World Industries, Inc. (Basis of Design)

B. Attachment devices:

1. Armstrong World Industries, Inc.(Basis of Design)

C. Alternative products shall be considered provided alternative product have the essential characteristics meeting basis of design as Approved equal / determined by the Architect during prior approval process.

2.2 ACOUSTICAL CLOUD UNITS

A. Acoustical Cloud:

1. Surface Texture: Smooth
2. Composition: Fiberglass
3. Surface finish: DuraBrite acoustically transparent membrane on front and edges
4. Color: (White)
5. Shapes: Standard

a. Nominal 4 foot x 4 foot Shapes

6. Convex, Item #5441
5. Concave, Item #5442
6. Thickness: 7/8 inch

7. Edge Detail: Square edge
8. Flame Spread: (ASTM E 84), Class A
9. Light Reflectance: (LR): (ASTM E 1477), White: 0.90
10. Acoustical Absorption: (ASTM C423), [White: Minimum 1.17 Sabins/sf] Recycle Content: Minimum 35%
11. Antimicrobial protection: Inherent - Resists the growth of mold/mildew and bacterial growth.
12. Sustainability: The panels are eligible for reclamation.

2.3 ATTACHMENT SYSTEMS

A. Installation Hardware Kits for (individual suspension) (direct attachment to drywall) (group suspension):

1. 5450 – Deck Hanging Kit
2. 5451 – Grouping Frames
3. 5452 – Frame Splice Kit
4. 5453 – Frame Alignment Kit
5. 5454 – Panel Hook Kit

PART 3 - EXECUTION

3.1 PREPARATION

A. Measure each ceiling area and establish layout of acoustical clouds and installation hardware. Comply with reflected ceiling plans. Coordinate panel layout with mechanical, electrical and sprinkler fixtures.

3.2 INSTALLATION

A. Install panels in accordance with the manufacturer's instructions, LA-297302, and in compliance with the authorities having jurisdiction.

3.3 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical clouds per manufacturer's instructions.

END OF SECTION 098439

SECTION 099419 - PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work as evident on drawings and specified herein or required to complete painting requirements including but not necessarily limited to the following:

1. Painting and finishing of interior and exterior exposed items and surfaces throughout the project except as finished otherwise.
2. Paint all exposed surfaces whether or not colors are designated in "schedules," except where the natural finish of the material is obviously intended or is specifically noted as a surface not to be painted. Where items or surface are not specifically mentioned in the paint or color schedule, paint these the same as adjacent similar materials or surfaces.
3. Do not paint name plates, operating instructions, operating mechanisms, or code required labels.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's technical information including paint label analysis, application instructions, and Material Safety Data Sheets (MSDS) for each material proposed for use.

B. Samples: Submit samples for Owner's review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Provide a listing of the material and application for each coat of each finish sample.

C. Color Selection:

1. Initial color selections shall be made from manufacturer’s standard color chips.
2. Submit 12 x 12 draw down cards for each paint material of each color and gloss selected.
3. Provide field sample (mock up) on actual substrates with full-coat finish on at least 100 SF of surface until required sheen, color, and texture are obtained. Simulate finished lighting conditions.

1.3 COLORS

A. Colors shall match the respective color specimens as indicated on the drawings on the material finish legend. Under coats shall vary slightly from the color of the next coat. Advise Owner 48 hours prior to the application of any finish coat.

B. Colors selected may be from manufacturer's standard or manufacturer's deep shades and custom colors.

C. Colors may be mixed and matched per Owner's direction.

1.4 INSPECTION

A. Inspect all surfaces to be treated prior to the application of painting material and arrange for the satisfactory correction of all defects in workmanship and/or material that might affect the work specified hereunder. Paint shall not be applied to wet, dusty, damp, dirty, fingermarked, unfinished, rough or otherwise defective surfaces until such conditions have been properly remedied. The application of any painting material on any surface shall constitute an acceptance by the Contractor of such surface as being fit condition to receive such materials.

1.5 COORDINATION WITH OTHER TRADES

A. Cooperate with all other trades during the execution of this contract by protecting their work, materials and equipment.

1.6 PROTECTION OF WORK

A. Protect adjacent work and materials by suitable means to avoid damage and/or staining in any way connected with this work.

1. Doors shall be demounted and hardware removed before painting doors or frames. Refer to Sections 081113 and 081416.
2. Use of any type solvent on finish hardware is prohibited.

1.7 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Name or title of material.
2. Manufacturer's stock number and date of manufacturer.
3. Manufacturer's name.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

1.8 JOB CONDITIONS

A. In areas scheduled to receive alkyd enamel, lacquer, epoxy, or other catalyzed finishes:

1. Provide positive mechanical ventilation (exhaust) of spaces where materials are prepared, applied, and tools or equipment are cleaned. Spaces shall be ventilated while materials are prepared, applied, and during curing.
2. Apply lacquer and epoxy materials only after 5:00 pm Fridays and before 7:00 pm Saturdays. Maintain ventilation until 7:00 am Monday.

1.9 QUALITY ASSURANCE

A. Comply with the requirements of the Painting and Decorating Contractors of America (PDCA) Technical Manual.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Comply with VOC regulations promulgated by the Environmental Protection Agency.

B. All paint materials shall be lead and mercury free.

PART 2 - PRODUCTS

2.1 MATERIAL QUALITY

A. Provide the best quality grade of the various types of coatings as regularly manufactured by the paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade, first quality, product will not be acceptable.

1. Proprietary names used to designate colors are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.

B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only within recommended limits.

C. Pre-approved stain manufacturers are: ICI Paint Stores, Dunn Edwards Corp., Frazee/Deer-O, and Sherwin-Williams Paint Company.

D. Top-of-the-line products for approved manufacturers are:

1. ICI Paint Stores:

a. Interior: #7500 Sintec High-Gloss Industrial Enamel, #SG45-11 Sinco Speed Semi-Gloss Enamel, #1698 Sinco Gloss Acrylic High-Gloss Enamel, #3000 Aqual Suede Low Sheen (water based) Enamel, #UH4100 Glidden Ultra Eggshell.
b. Exterior: #4800 Aqua Sash Acrylic Semi-Gloss Enamel, #1300 Stucco-Life Acrylic Flat, #DS 8700 Decrashield Acrylic Flat, #DS 8900 Decrashield Acrylic Semi-Gloss.
c. McCloskey Exterior Satin Spar Varnish.
d. DuPont Dp76P Acrylic Epoxy (water based).
e. DeVoe True Glaze Epoxy (water based).

2. Dunn-Edwards Corporation:

a. Interior: W 440 Eggshell 100% Acrylic Interior Enamel, 9-Line Semi-Gloss Alkyd Synthetic Interior/Exterior Enamel, 10-Line Gloss Alkyd Synthetic Interior/Exterior Enamel, W 901 Semi-Gloss 100% Acrylic Interior/Exterior Enamel, W 450 Semi-Gloss 100% Acrylic Interior Enamel, W 199 Alkyd Semi-Gloss Varnish.
b. Exterior: (In addition to those listed under interior) W 701 Flat 1005 Acrylic Exterior Masonry Finish.

3. Frazee Paint Company:

   a. Interior: Lo-Glo Interior Acrylic Eggshell Enamel, Satin-Glide II Interior/Exterior Semi-Gloss Acrylic Enamel, Mirraglide Interior/Exterior Lo-Sheen Semi-Gloss and Gloss Acrylic Enamel.
   b. Exterior: (In addition to those listed under interior) Dura-Tec Exterior 100% Acrylic Flat, Royal Supreme Exterior 100% Acrylic Lo-Lustre.
   c. Alkyds: Aro-Plate II Synthetic Alkyd Gloss and Semi-Gloss Quick Drying, Aro-Guard water reducible 2 component Gloss Epoxy.
   d. Varnishes: McCloskey Brands – Heirloom Satin & Gloss, Man-O-War Polyurethane Satin & Gloss Varnish, Man-O-War Exterior Spar Varnish Satin & Gloss.

4. Sherwin Williams:

   a. Interior: ProMar 200 Latex Eg-shel Enamel B20W201, ProMar 200 Latex Semi-Gloss Enamel B31W201, ProMar 200 Latex Gloss Enamel B21W201.
   b. Exterior: Gloss Alkyd – Industrial Enamel B54 Series, ProMar 200 Alkyd Semi-Gloss, A100 Exterior Acrylic Gloss A8 Series, A100 Exterior Acrylic Flat A6 Series.
   c. Epoxy: Water-Based Catalyzed Epoxy B70 Series Gloss and Semi-Gloss.
   d. Varnish: Oil Based Satin Varnish A66F90.

5. See Section 030500 Concrete Floor Sealer.
6. Coverage for drywall.

   a. 300 – 350 sq. ft./coat.
   b. Minimum 3 coats.
   c. First coat – 1.2 mils dry.
   d. Second coat – 1.6 mils dry.
   e. Third coat – 1.6 mils dry.
   f. Fourth coat – 1.6 mils dry.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Techniques and procedures shall comply with PDCA requirements for a Type I standard job.

B. Only skilled mechanics shall be employed and workmanship shall be of the highest quality.

C. Only specified or approved materials shall be delivered to the job site in their original containers. Seals and labels shall be unbroken and intact.

D. No exterior painting shall be done in damp or rainy weather or at temperatures below 50°F. Varnish and lacquer to be applied only when protected from dust and not applied at temperatures below 70°F.

E. The number of coats of finish listed is minimum. Contractor shall fulfill the requirements that the final coat applied shall be entirely acceptable and free of all defect regardless of number of coats applied.

3.2 SURFACE PREPARATION

A. All surfaces to be painted or primed shall be cleaned of all foreign material, smoothed, and minor defects removed by light sanding. Note: Fire rating labels on fire doors must not be removed for painting or other finish application, mask as required.

B. Wood surfaces, except surfaces to be given natural finish, shall be primed and finish-coated as specified in the painting schedule herein. Wood surfaces to be painted shall be cleaned of dirt, oil and other foreign substances with mineral spirits, scrapers, and/or sandpaper. Finished surfaces exposed to view shall be made smooth by sand-papering. The surface shall be checked to insure that finishing nails have been properly set; then all holes and surface imperfections shall be primed. After priming, all holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, allowed to dry, and sandpapered smooth.

1. Interior wood surfaces to receive stained or natural finish, except as hereinafter specified, shall be properly prepared to the approved shade and lightly sanded. Each varnish coat shall be lightly sanded prior to application of subsequent coat.

C. Metal (ferrous surfaces that have not been shop-coated): Surfaces shall be washed with benzene or mineral spirits to remove any grease, oil, or dirt. Where rust appears, wire brush and sandpaper clean before painting. Touch-up scarred shopcoats before painting.

D. Metal: (Shop coated ferrous surfaces): Abraded or corroded spots on shop-coated surfaces shall be wire-brushed and touched-up with material similar to the shop coat. Sand smooth as required to provide base for finish coats.

E. Galvanized Metals: Shall be solvent-cleaned and treated with commercial galvanized metal preparation solution.

F. Concrete and masonry surfaces shall be prepared by removing efflorescence, chalk, dust, dirt, grease, oil, asphalt, tar, excessive mortar and mortar droppings. Surface deposits of free iron shall be removed prior to painting.

G. Gypsum Board: Surfaces shall be clean, free from grit, and surface irregularities.

H. Plaster and Veneer Plaster: Surfaces shall be cured and hard and free of loose material. Fill hairline cracks and patch damaged areas.

3.3 APPLICATION

A. All coats of any material whatsoever shall be bone dry and inspected by the Owner before application of succeeding coat (24 hours minimum drying time).

B. All paint, varnish or lacquer shall be free from runs, sags, crawls or holidays, whether sprayed, rolled or brushed (at the option of this Contractor). Spray painting shall be accomplished with airless equipment. All "cutting in" shall consist of sharp, true lines and any workmanship to the contrary will be rejected.

C. All door tops, bottoms and side edges shall receive same coats as balance of surface of doors. Finish or paint all wood doors and trim whether in a finished room or not.

D. All exposed electrical conduit, hangers, outlet boxes, junction boxes, raceways, gutters, supporting frames, piping, ductwork, grilles, registers, or unprimed electrical equipment in rooms calling for wall and/or ceiling finishes, shall be painted two coats of adjacent finish over prime coat.

E. Any hot spots or suction spots noticeable after application of first coat shall be neutralized or touched up before applying second coat. The last coat shall produce an even result.

F. Covered mixing cans unlabeled and clean shall be provided in sufficient number. Empty cans left clean; all brushes kept clean and in perfect condition when not in use.

G. All job site finished wood trim and mill work shall be given a priming coat on the back surfaces before setting.

H. Apply transparent masonry sealer with low pressure airless spray equipment in accordance with manufacturer's instruction. Apply as a flood coat at rate recommended by manufacturer but in no case less than 1 gallon per 150 square feet. Clean up excess material and drips.

3.4 CLEAN-UP AND PROTECTION

A. Clean-Up: During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.

1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting, as acceptable to the Architect.

1. Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
2. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.5 AS-BUILT SCHEDULE

A. Submit schedule, organized by room, indicating manufacturer, type and top coat color for each paint system used in each space. Schedule is not required for paint systems in concealed locations.

3.6 PAINT SCHEDULE

A. Interior:

1. Gypsum Board and Plaster - General:

a. 1 coat primer sealer applied prior to texturing (omit on plaster).
b. 1 coat pigmented sealer.
c. 2 coats 100% acrylic, low sheen enamel (eggshell, 25 to 35% gloss).

2. Ferrous Metal - Metal door and window frames, grilles and registers not factory finished, all exposed piping and conduit and miscellaneous exposed items:

   a. 1 coat metal primer (if not factory-primed).
   b. 2 coats alkyd semi-gloss enamel (50 to 60% gloss level).

3. Galvanized Metal:

   a. 1 coat galvanized metal primer, or
   b. 1 coat primer.
   c. 2 coats alkyd enamel, match gloss of adjacent surfaces.

4. Stained Finish for Wood Doors:

   a. 1 coat stain matching selected color sample.
   b. 2 coats alkyd varnish, satin.

5. Fabric Covered Pipe or Duct Insulation:

   a. 2 coats 100% acrylic latex, flat.

6. Miscellaneous items exposed to view not otherwise scheduled:

   a. Finish with compatible paint to match adjacent finish and color.

7. Standard safety color code for pipe lines, machinery, equipment conduits, etc.

   a. Markings designated by type of room area, or location.

      1) All Mechanical Rooms, Electrical Rooms, Communications Rooms, Janitor, Storage, and All other Interior Areas:

         a) All exposed pipe lines, ducts, plenums, conduits, hangers, etc., shall be painted with one prime coat and two coats of industrial enamel to match adjacent areas and pipes shall be banded and stenciled with direction of flow arrows at entrance and exit of all pipes within such areas.
         b) All concealed pipe lines which are accessible by access doors, ceiling removal, etc., shall be banded and stenciled with direction of flow arrows at each point of entry, junction, or exit to the concealed space and banding shall be repeated at distances not to exceed 20 feet between identifying bands, and shall be repeated at each valve, gauge and thermometer.
         c) All concealed pipe lines, conduits, etc., which are furred in or otherwise non-accessible shall not be painted but all hangers or supports shall be painted according to code.
         d) All exposed machinery and equipment shall be painted in accordance with Paragraph 1.b. above.
         e) All exposed electrical conduits shall be painted to match adjacent areas.

   b. Banding:

      1) In banding, alkyd enamel only shall be used. No colored tape or substitute is allowed. A band shall consist of a line or stripe 2" or 1" in width around the pipe, as herein designated. Banding shall be done with care, using suitable, masking as required, to maintain accurate width of bands and quality workmanship appearance.

c. Flow Arrows: Identify each piping system provided under this Work with direction of flow indicated by means of stenciled flow arrows. Flow arrow color: Black.

d. Color Identification

1) The following color numbers and names are taken from Plochere Color System. This is intended to standardize all pipe line, machinery and equipment colors, and all paints used shall match these:

#26	Zinc Chromate Primer (Brushing)	#241	Poppy Orange
		#1010	Jade Green
#319	Cotton Candy	#730	Marine Blue
#816	Wedgwood	#G187	Boulder Gray
#1078	Oasis	#385	Engine Red
#337	Chinese Red	#555	Purple
#217	Sable	#1017	Leaf Green
#932	Turquoise	No Number	Black
#127	Soft Ivory	#122	Burnt Gold
#97	Bright yellow	#144	Shasta White

e. Identification Schedule (As Applicable):

1)	Domestic Cold Water	#730	Marine Blue - 2" band or entire length.
2)	Domestic Hot Water	#127	Soft Ivory -2" Band or entire length.
3)	Equipment	#127	Soft Ivory - Two Coats over prime.
4)	Fire Sprinkler Lines		Black -2" band or entire length.
5)	Gas	#G187	Boulder Gray -2" band or entire length.
6)	Guards (Machinery)		Aluminum
7)	Machinery and Pumps	#1017	Leaf Green. Two coats over prime coat.
8)	Waste, Vent & Sewer		Black - 2" band or entire length.
9)	Misc. Equipment Accessories		Black - Two coats over prime coat. (Valve handles, Hangers, Misc. Catwalks, etc.)

f. Procedure for Painting Copper Pipe:

1) Thoroughly clean with steel wool and de-grease with solvent. Apply one coat of spar varnish and allow to dry for 48 hours. Apply enamel paint as directed.

g. General Painting Procedure:

1) Cleaning and preparing surfaces for painting:

a) Clean all surfaces properly, free from dirt, oil, was, grease, etc., before applying prime coat of paint.

2) Prime coat for metal surfaces shall be Tnemec 104-HS-Epoxoline-XX, Val-Chem Hi-Solids Epoxy 76 Series, or equal.

3) Finish Coat:

a) The final coat of finish enamel shall be of Tnemec 74-Endura-Shield, Valspar V-Thane Hi-Build Urethane 54 Series, or equal, of the color shown to properly identify each item.

END OF SECTION 099419

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work as evident on drawings and specified herein or required to furnish and install complete floor and ceiling mounted metal toilet compartments, and wall mounted urinal partitions.

1.2 SUBMITTALS:

A. Manufacturer's Data: Submit two copies of manufacturer's detailed materials, fabrication specifications and installation instructions.

B. Shop drawings.

1.3 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

1.4 REGULATORY REQUIREMENTS

A. Comply with ANSI A117.1 Accessibility Standards for the Handicapped.

PART 2 - PRODUCTS

2.1 TOILET COMPARTMENTS AND URINAL PARTITIONS

A. Toilet Compartments: Floor mounted with ceiling brace, sizes and doors as indicated on the drawings.

B. Urinal Partitions: Floor mounted, size as indicated on the drawings.

C. Acceptable Manufacturers are:

1. Accurate
2. Global
3. Knickerbocker
4. Metpar
5. Sanymetal
6. Substitutions: Items of suitable function and performance are acceptable in conformance with Section 16000 - Substitutions.

D. Finish shall be manufacturers.

2.2 CONSTRUCTION

A. Panel Thickness: 1-1/4" at stiles and 1" at doors and other panels.

B. Face Sheets: Steel sheet complying with ASTM A-366-72, commercial quality, cold-rolled, stretcher leveled. For stainless steel finish provide sheet having galvanized- bonderized finish each face. Face sheets shall be not less than 20 gauge for overhead bracket pilasters, 20 gauge for panels, and 22 gauge for doors.

C. Cores: Manufacturers standard sound-deadening type product.

D. Stile Shoes: 3" high stainless steel.

2.3 HARDWARE AND ACCESSORIES

A. Provide manufacturer's standard designs except that all components products shall be brass with polished chrome finish or polished stainless steel. Furnish all anchors, brackets, plinth covers and hardware as necessary for operation and as specified. Panels, pilasters and doors shall be factory prepared to receive the hardware and accessories. No aluminum or zamac products will be accepted.

B. Hinge Sets: Gravity type, spring activated type or concealed torsion type, adjustable to hold door open at any desired angle.

C. Door Strike and Keeper: Designed for through-bolt attachment to the stile, rubber padded.

D. Latch: Surface mounted slide latch activated by easily operable thumb piece on inside.

E. Coat Hooks: Combination coat hook and rubber tipped bumper type on door.

F. Door Pull: A type suitable for the insertion of not less than three fingers.

G. Toilet Accessories: As specified in Section 102800.

H. Grab Bars: As specified in Section 102800.

2. 4 FASTENINGS

A. Appropriate for the task, matching finish of hardware and fittings, Phillips head except that one way fasteners shall be used for attachment of accessories. Use hex nuts and studs for through bolting at brackets and similar locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install partitions rigid, straight, plumb and level, with the panels laid out as shown. Provide clearances of not more than 1/2" between pilasters and panels, and not more than 1" between panels and walls. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of the panel. Secure brackets to floors and supporting walls with manufacturer's recommended anchoring devices as shown on final shop drawings or in manufacturer's instructions.

3.2 HARDWARE ADJUSTMENTS

A. Adjust and lubricate hardware for proper operation after installation.

1. Set hinges on in-swing doors to hold doors open approximately 30 degrees from the closed position when unlatched.

3.3 CLEANING AND FINAL ADJUSTMENT

A. Protect units after erection so that there will be no indication of use or damage at the time of acceptance. Replace damaged work as directed.

B. Perform all final adjustments to pilaster leveling devices, door hardware, and other operating parts of the partitions assembly just prior to final inspection. Clean exposed surfaces of partitions, hardware, fittings and accessories, and touch-up minor scratches and other finish imperfections using materials and methods recommended by the partitions manufacturer.

END OF SECTION 102113

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Toilet accessories.

1.2 REFERENCES

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

E. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

F. ASTM C1036 - Standard Specification for Flat Glass.

G. FS DD-M-411C -- Mirrors, Glass.

1.3 SUBMITTALS FOR REVIEW

A. Section 013000 - Submittals: Procedures for submittals.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed are made by Bobrick.

B. Substitutions: Items of suitable function and performance are acceptable in conformance with Section 016000 – Substitutions.

C. Multiple units of each type of accessory shall be furnished by the same manufacturer.

2.2 MATERIALS

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

1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Stainless Steel Sheet: ASTM A167 , Type 304.

C. Stainless Steel Tubing: ASTM A269, stainless steel.

D. Galvanized Sheet Steel: ASTM A653, G60.

E. Mirror Glass: Float glass, Type I, Class 1, Quality q2 (ASTM C 1036), with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with FS DD-M-411.

F. Adhesive: Two component epoxy type or contact type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized , tamper-proof.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, Type SC 2, satin finish, unless otherwise noted.

C. Galvanizing for Items other than Sheet: ASTM A123 to 1.25oz/sq yd. Galvanize ferrous metal and fastening devices.

2.4 TOILET ROOM ACCESSORIES

A. Toilet Tissue Dispenser: Owner furnished, Owner installed.

B. Paper Towel Dispenser: Owner furnished, Owner installed.

C. Soap Dispenser: Owner Furnished, Owner Installed.

D. Mirrors: Custom size, Section 088000, Glazing.

E. Grab Bars: Stainless steel, 1-1/2 inches outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.

1. Length and configuration: As indicated.

F. Combination Sanitary Napkin/Tampon Dispenser: Owner furnished, Owner installed.

G. Sanitary Napkin Disposal: Owner furnished, Owner installed.

H. Hat and Coat Hook: Stainless steel, single prong.

I. Hand Dryer: Dyson Airblade hygienic hand dryer, die-cast aluminum, 120v ac, single phase, 1400w.

J. Under Lavatory Sink Guards: Plumblex Specialty Products, Thiebro by IPS Corporation.

NOTE: Refer to toilet accessory schedule at end of this section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and verify existing job conditions. Correct any deficiencies before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on product data and instructed by the manufacturer.

3.2 PREPARATION

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

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

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.

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

C. Mounting Heights and Locations: As indicated on drawings.

3.4 SCHEDULE

Description		Mounting Mode	Model #
T1)	Grab Bar, 36"	Surface	B-6806 x 36
T2)	Grab Bar, 42"	Surface	B-6806 x 42
T3)	Toilet Tissue Dispenser	Surface	OFOI
T4)	Toilet Seat Cover Dispenser	Surface	Not used
T5)	Paper Towel Dispenser/Disposal	Surface	OFOI
T6)	Grab Bar, 18" vertical	Surface	6806X18
T7)	Hand Dryer	Surface	Dyson Airblade
T8)	Soap Dispenser	Surface	OFOI
T9)	Mirror with Frame	Surface	Section 088000
T12	Robe Hook	Surface	B671
T13)	Sanitary Napkin Disposal	Surface	OFOI
T16)	Sanitary Napkin / Tampon Dispenser	Surface	OFOI

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Fire extinguishers – provided by Owner.

B. Cabinets/Brackets.

C. Accessories.

1.2 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for extinguishers.

1.3 SUBMITTALS

A. Submit product data. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.

B. Submit manufacturer's installation instructions.

1.4 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data.

B. Include test, refill or recharge schedules, procedures, and re-certification requirements including requirements applicable to the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. JL Industries.

B. Larsen Manufacturing.

C. Potter-Roemer, Smith Industries.

D. Substitutions: Items of suitable function and performance are acceptable in conformance with Section 1600 – Substitutions.

2.2 EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type: UL Rated 3A:40BC in enameled steel container for Class A, Class B, Class C fire – provided by Owner.

2.3 CABINETS

A. Cabinet: Where designated, formed steel sheet, minimum 20 gauge frame, 22 gauge door and box, and semi-recessed type with square trim, size to accommodate extinguishers specified.

B. Door: Vertical door design with pull handle, keyed lock with "pull to open" cam lock release, narrow vertical window with laminated safety glass. Provide vertical lettering, in contrasting color "Fire Extinguisher."

C. Mounting Hardware: Appropriate to cabinet and substrate.

D. Finish: Baked enamel. Color: Red.

2.4 CABINET FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Predrill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

D. Hinge doors for 180 degree opening with continuous piano hinge.

E. Key clock cylinders as directed by Pima County Lockshop.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify substrates for cabinet are correctly prepared.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install cabinets plumb and level on walls or columns 26 inches from finished floor to inside bottom of cabinet.

B. Secure rigidly in place in accordance with manufacturer's instructions.

C. Mount top of extinguisher at 48 inches AFF.

END OF SECTION 104413

SECTION 122400 – ROLLER SHADES

PART 1 - GENERAL

1.1 SCOPE

A. Per each installation, comply with and provide all labor, materials, equipment and services necessary to furnish and install Roller Shade units and heavy-duty head rails.

1.2 SUMMARY

A. This section includes the following:

1. Shade Materials
2. Clutch Operating System
3. Chain Driven
4. Hardware
5. Accessories/Options

B. Related Documents

1. General and Supplementary Conditions
2. General Requirements

1.3 DEFINITIONS

A. Clutch Operating System - Heavy Duty Commercial

B. Roller Shades: Solar

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and General Requirements.

B. Product Certificates signed by manufacturer certifying that all products comply, meet or exceed national and local regulations controlling the use of volatile organic compounds (following each installation).

1.5 QUALITY ASSURANCE

A. Manufacturer(s) qualifications: Firm must be a material manufacturer with not less than ten (10) years of roller hardware and shade cloth production experience whose published literature clearly indicates general compliance with requirements in this section.

B. Vendor qualifications:

1. Shall be approved by manufacturer as an established window covering company for not less than five (5) continual years.
2. Shall be authorized by the manufacturer as a dealer to supply the products specified, and to honor any claims against product presented in accordance with warranty.
3. Shall be certified and trained in installation of shade assemblies.

C. Installer qualifications:

1. Installers to have a minimum of five (5) continual years experience with the installation of commercial heavy-duty units. Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent.
2. Installer shall be responsible for acceptable installations.

D. Fire -Test-Response Characteristics: Provide vertical Roller Shades identical to those tested for the following fire-test-response characteristics as determined by UL or another testing and inspecting agency and that they comply with Boston or California Class 1 Fire Codes.

1. Test Method: NFPA 701-99
2. Rating: Pass

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver Roller Shade units in original manufacturer's cartons clearly labeled with identification of manufacturer, brand name, and installed location.

B. Store inside, in a well-ventilated area protected from weather, blocked off ground to prevent sagging, twisting or warping.

C. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

D. Store products at the site to facilitate inspection and measurement of quantity or counting of units.

1.7 PROJECT CONDITIONS

A. Roof must be tight, windows and frames installed and glazed.

B. Wet work, including concrete, masonry, plaster, stucco, terrazzo, sheetrock, spackling, and taping (including sanding) shall be complete and dry.

C. Ceilings, window pockets, electrical, and mechanical work above the product shall be complete.

D. Field measure before fabrication.

1.8 SEQUENCING AND SCHEDULING

A. Schedule delivery to minimize long-term storage at the site, to prevent overcrowding of construction spaces and minimize the possibility of theft or other loses.

1.9 GUARANTEES

A. Contractor shall guarantee the installation of the clutch roller system for a period of three (3) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hunter Douglas, Basis of Design, Sheerweave 1% & 3% Openness

B. MechoShade

2.2 PRIOR APPROVALS

The following information is required for offers of products submitted for Prior Approval (see Instructions to Bidders).

A. A certified manufacturer's sample of a heavy duty commercial clutch roller system no less than 18"w to include:

1. #10 bead chain
2. Aluminum hem bar
3. Wrapped roller tube
4. 24" length of solar fabric, with 3% openness specified.

B. Certified manufacturer's color samples not less than 12" square.

C. All printed specification materials for each product.

D. Certifications on manufacturer's letterheads signed by an officer of the company affirming that submitted samples conform with the specifications.

E. Completed item 2.3 MATERIALS, "A" CHART.

2.3 MATERIALS

A.

PRODUCT CHARACTERISTICS	PROPOSED PRODUCT		SCORE
ROLLER SHADES	***Provide required information below and attach certified documentation.***		***Score 1 pt for each positive response***
HARDWARE	***Complies***	***Submittal***	***Score***
SHADE MOUNTING SYSTEM	☐		
SHADE MAY BE REMOVED WITHOUT REMOVAL OF MOUNTING BRACKETS	☐		
SHADE MAY BE CHANGED WITHOUT REMOVAL OF TUBES	☐		
STAPLES NOT USED TO ATTACH SHADE CLOTH	☐		
NO FASTENERS USED TO ATTACH SHADE CLOTH	☐		
TOTAL WRAP OF SHADE CLOTH ON TUBE NOT TO EXCEED ONE FULL TUBE PERIMETER	☐		
MOUNTING BRACKETS	☐		
1/8" (3mm) STEEL	☐		
STANDARD SINGLE BRACKET	☐		
SUPPORT BRACKETS	☐		
CEILING TYPE OF 1/8" STEEL	☐		
CENTER TYPE 1/8" STEEL	☐		

REGRESSED END PLUGS	☐		
PREVENT LIGHT LEAKAGE	☐		
PREVENTS BINDING BETWEEN TUBE AND BRACKETS	☐		
PLASTIC COMPONENTS	☐		
ALL TO BE ONE PIECE MOLDED DUPONT DELRIN	☐		
TUBE COVER PLATE	☐		
TUBE WILL NOT DISLOCATE	☐		

CHAINS	☐		
LEFT OR RIGHT LOCATION	☐		
STAINLESS STEEL	☐		
2 CHAINS MAY BE IN SAME LOCATION	☐		
DISTANCE BETWEEN CENTER LINE OF OPERATING CHAIN NOT TO EXCEED ½"	☐		

HEMBARS	☐		
ALUMINUM	☐		
TO BE SAME WIDTH AS SHADE BAND	☐		
CONCELAED IN FABRIC HEM POCKET	☐		
OPTIONAL EXPOSED PAINTED PPG FINISH	☐		
EXPOSED HEMBAR WITH KEYWAY FOR SHADE CLOTH	☐		

OPERATION	☐		
OFFSET DRIVE CHAIN ASSEMBLY	☐		
CHAIN TO REAR OF SHADE CLOTH	☐		
REGULAR ROLL POSITION	☐		
MULTIPLE BAND SHADE SYSTEM OPERATES BY SINGLE CHAIN	☐		
DRIVE END BRACKETS	☐		
REQUIRE NO ADJUSTMENT	☐		
SYNCHRONIZED SINGLE CHAIN DRIVE BRACKET FOR MULTI-BAND SHADES	☐		
LIFT ASSIST MECHANISM FOR OVERSIZED OR MULTIBANDED MANUAL SHADES WEIGHING 10-20 LBS.	☐		
BRAKING	☐		
OVERRUNNING CLUTCH	☐		
DISENGAGES TO 90% DURING RAISING OR LOWERING OF SHADE	☐		
WITHSTAND A PULL FORCE OF 40 LBS.	☐		
SELF-LUBRICATING OIL IMPREGNATED STEEL HUB MOUNT	☐		
NON-JERKING, SMOOTHJ OPERATION	☐		

FAIL SAFE	☐		
DRIVE CHAIN BREAKS AT 60-90 LBS.	☐		
WARRANTY & GUARANTEE	☐		
LIFETIME WARRANTY AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP	☐		
25 YEARS ON OPERATION AND PARTS	☐		
3 YEARS GAURANTEE FOR LABOR AND INSTALLATION	☐		

SHADES	**Complies**	**Submittal**	**Score**
SHADE CLOTH	☐		
Indoor Air Quality ASTM D5116-97	☐		
Indoor Air Quality ASTM D6670-01	☐		
Formaldehyde < 0.05 ppm	☐		
TVOC <0.50 mg/m^3	☐		
Fungus Resistance Test G21-02 Mixed Culture Test	☐		
Mildew Resistance GM 9309-P Pink Stain Test	☐		
Flame Resistance NFPA 701-99 Vertical Burn	☐		
Fire Gas Toxicity LC50 22.5g Pittsburg Toxicity Test	☐		
UV Resistance	☐		
Heat Resistance ASTM D794-82 130° C	☐		
Weatherability 1200 hours G53-96	☐		
Asbestos Free	☐		
PVC Free	☐		
Abrasion Resistance ASTM D 3884-92	☐		
Ball Burst CAN/CGSB 4.2M >594 lb.	☐		
Tearing Strength CAN/CGSK 4.2 >45 LBS.	☐		
Stretch Recovery to Original Shape 1 hour Both Warp & Weft	☐		
COLORS	☐		
Sandstone, or equal	☐		
SOLAR SHADE OPENNESS	☐		
3% Openness with 95% UV Blockage	☐		

SHADE FABRICATION	☐		
Provide Batten when Shade Exceeds 1:4 Ratio Railroaded	☐		
Shade will not Hourglass	☐		
Batten Joint not to exceed 1-1/2"	☐		
Seal cut Edges	☐		
Shade size up to 126"W x 180"H	☐		
WARRANTY	☐		
Ten year "Fit-For-Use" on Shade Bands	☐		

2.4 FABRICATION

A. Fabricate roller shade units to have cord lock locations to be designated on a case-by-case basis.

B. Fabricate roller shade units installed between jamb:

1. Width equal to ½" per side less than the jamb dimension.
2. Length equal to ¼" less than the head rail to sill dimension.

C. Fabricate roller shade units installed outside jambs:

1. Width and length as indicated (on a case by case basis) with termination between blinds of end-to-end installations at centerline of mullions or other defined vertical separations between openings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of vertical roller shade. Do not proceed with installation until satisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install blinds level, plumb, and located so hem bar in any position is not closer than 1" to interior face of glass lights.

B. Do not remove warning labels describing hazards of roller shades.

C. Isolate metal parts of blind units from concrete or mortar to prevent galvanic action.

D. Use tape, thick coating of epoxy or other means recommended by the manufacturer to effect separation.

E. Securely anchor units with clips, brackets and anchorages suited to type of mountings.

F. Provide adequate provision for unencumbered operation of window sash hardware.

G. During construction sequence roller shade installation with other work to minimize the possibility of damage and soiling during the remainder of construction.

H. Install window shade unit at all exterior windows.

3.3 FIELD TESTING/ADJUSTMENTS

A. Test operation of each blind unit and adjust as required to provide smooth operation.

B. Repair or replace damaged units as directed.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces, according to manufacturer's instructions, after installation.

B. Remove surplus materials, packaging, rubbish, and debris resulting from installation.

C. Leave installation areas neat, clean, and ready for use.

D. Protect tested and installed units to ensure optimum operating conditions without damage, blemishes or indication of use at completion of project.

END OF SECTION 122400

SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

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

a. Corian, DuPont, E. I. du Pont de Nemours and Company.
b. Samsung Chemical USA, Inc.
2. Type: Provide Standard type.
3. Colors and Patterns: Per Finish Schedule or as selected by Architect from manufacturer's full range.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

   1. Grade: Premium.

B. Configuration:

   1. Front: Straight, slightly eased at top
   2. Backsplash: Straight, slightly eased at corner.

C. Countertops: 3/4-inch- (12.7-mm-) thick, solid surface material laminated to 3/4-inch- (19-mm-) thick particleboard with exposed edges built up with 3/4-inch- (19-mm-) thick, solid surface material as indicated on drawings

D. Backsplashes: 3/4-inch- (19-mm-) thick, solid surface material.

E. Joints: Fabricate countertops without joints.

F. Joints: Fabricate countertops in sections for joining in field to minimize joints

G. Cutouts and Holes:

   1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

B. Sealant for Countertops: Comply with applicable manufacturer recommendations & requirements

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.

B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions.

D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.

F. Install aprons to backing and countertops with adhesive.

G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

D. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves.
b. Piping NPS 6 and Larger: Cast-iron pipe sleeves.

2. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.
b. Piping NPS 6 and Larger: Steel pipe sleeves.

3. Interior Partitions:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.

C. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.2 FLOOR PLATES

A. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Insulated Piping: One-piece steel with polished, chrome-plated finish.

c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with finish.

2. Escutcheons for Existing Piping to Remain:
a. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: Split floor plate.
2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 210518

SECTION 210523 - GENERAL-DUTY VALVES FOR FIRE PROTECTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Iron butterfly valves with indicators.
2. Check valves.
3. Iron OS&Y gate valves.
4. NRS gate valves.
5. Indicator posts.
6. Trim and drain valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:

1. Main Level: HAMV - Fire Main Equipment.

a. Level 1: HCBZ - Indicator Posts, Gate Valve.
b. Level 1: HLOT - Valves.

1) Level 3: HLUG - Ball Valves, System Control.
2) Level 3: HLXS - Butterfly Valves.
3) Level 3: HMER - Check Valves.
4) Level 3: HMRZ - Gate Valves.

2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.

a. Level 1: VQGU - Valves, Trim and Drain.

B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:

1. Automated Sprinkler Systems:

a. Indicator posts.

b. Valves.

1) Gate valves.
2) Check valves.

a) Single check valves.

3) Miscellaneous valves.

C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.

D. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B1.20.1 for threads for threaded-end valves.
3. ASME B31.9 for building services piping valves.

E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

F. NFPA Compliance: Comply with NFPA 24 for valves.

G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.

H. Valve Sizes: Same as upstream piping unless otherwise indicated.

I. Valve Actuator Types:

1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.2 IRON BUTTERFLY VALVES WITH INDICATORS

A. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig.
3. Body Material: Cast or ductile iron.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, nickel plated.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: Lug or wafer or Grooved-end connections.

2.3 CHECK VALVES

A. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.

2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.4 IRON OS&Y GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze.
5. Wedge Seat: Cast or ductile iron, or bronze.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved or Threaded.

2.5 TRIM AND DRAIN VALVES

A. Angle Valves:

1. Description:

a. Pressure Rating: 175 psig.
b. Body Material: Brass or bronze.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

A. Comply with requirements in the following Sections for specific valve installation requirements and applications:

1. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves in position to allow full stem movement.

G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

H. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections.

I. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

END OF SECTION 210523

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used elsewhere in the building.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 LABEL INSTALLATION REQUIREMENTS

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

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit a view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

END OF SECTION 210553

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Cover system for sprinkler piping.
3. Specialty valves.
4. Sprinklers.
5. Manual control stations.
6. Pressure gages.

B. Related Requirements:

1. Section 230523 "General-Duty Valves for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For wet-pipe sprinkler systems.

C. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which items of other systems and equipment are shown and coordinated with each other, using input from installers of the items involved.

B. Design Data:

1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13.
2. Locally adopted codes and standards

B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

C. Delegated Design: Engage a qualified professional to design wet-pipe sprinkler systems.

1. Available fire-hydrant flow test records indicate the following conditions: see drawings

2. Sprinkler system design shall be approved by authorities having jurisdiction.

a. Sprinkler Occupancy Hazard Classifications:

1) Building Service Areas: Ordinary Hazard, Group 1.
2) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
3) General Storage Areas: Ordinary Hazard, Group 1.
4) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
5) Office and Public Areas: Light Hazard.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.

4. Maximum Protection Area per Sprinkler: According to UL listing.
5. Maximum Protection According to UL listing and area per Sprinkler listed below, whichever is most stringent:

a. Office Spaces: 120 sq. ft.
b. Storage Areas: 130 sq. ft.
c. Mechanical Equipment Rooms: 130 sq. ft.
d. Electrical Equipment Rooms: 130 sq. ft.
e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

2.2 STEEL PIPE AND FITTINGS

A. Standard-Weight, Black-Steel Pipe: ASTM A53/A53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Black-Steel Pipe: ASTM A135/A135M; ASTM A795/A795M, Type E; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Black-Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.

D. Cast-Iron Flanges: ASME 16.1, Class 125.

E. Grooved-Joint, Steel-Pipe Appurtenances:

1. Pressure Rating: 175-psig minimum.
2. Galvanized Grooved-End Fittings for Steel Piping: ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Specialty Valves Pressure Rating: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175-psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

2.4 SPRINKLER PIPING SPECIALTIES

A. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

B. Branch Line Testers:

1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

C. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

2.5 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes: Chrome plated and bronze.

E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Plastic, white finish, one piece, flat.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

F. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.

2.6 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gage Range: 0- to 250-psig minimum.

D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

B. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

C. Install unions adjacent to each valve in pipes NPS 2 and smaller.

D. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

E. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

F. Install sprinkler piping with drains for complete system drainage.

G. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

H. Install alarm devices in piping systems.

I. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13."

J. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

K. Fill sprinkler system piping with water.

L. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing.

M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.2 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

G. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

H. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

   1. Install valves in vertical position for proper direction of flow, in main supply to system.
   2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.

3. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.4 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

3.5 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.7 PIPING SCHEDULE

A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:

1. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 and larger, shall be the following:

1. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.8 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Concealed sprinklers.
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Pendent, dry sprinklers; and sidewall, dry sprinklers.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors and partitions walls.

B. Install sleeves in concrete floors

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

2. Interior Partitions:

a. Piping Smaller Than NPS 6 Galvanized-steel-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

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SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze ball valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.2 ACTION SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With 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. Solder Joint: With sockets according to ASME B16.18.
2. Threaded: With threads according to ASME B1.20.1.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, but are not limited to, the following:

a. Apollo Inc.
b. Milwaukee Valve Company.
c. NIBCO INC.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

2.4 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 and Smaller:

1. Ball Valves: Two piece, full port, bronze with bronze trim.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Hot Piping: Type II cellular glass

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless-] steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.6 MISCELLANEOUS MATERIALS

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

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

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

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

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

G. Install lateral bracing with pipe hangers and supports to prevent swaying.

H. Install building attachments within concrete slabs or attach to structural steel.

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

J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

K. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

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

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
   b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
   c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.

4. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 ADJUSTING

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

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.3 PAINTING

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

   1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections."

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

3.4 HANGER AND SUPPORT SCHEDULE

A. Refer to details on project plans

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

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

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

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

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

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

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

F. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

G. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

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SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Warning signs and labels.
2. Pipe labels.

1.2 ACTION SUBMITTAL

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

PART 2 - PRODUCTS

2.1 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

B. Pipe Label Color Schedule:

1. Domestic Water Piping:

a. Background Color: Black.
b. Letter Color: White.
c. Identifiers:

1) DCW – Domestic Cold Water
2) DHW – Domestic Hot Water
3) DHWR – Domestic Hot Water Return

2. Sanitary Waste and Vent Piping:

a. Background Color: Black.
b. Letter Color: White.
c. Identifiers:

1) W – Sanitary Waste
2) V – Sanitary Vent
3) D – Drain and/or Condensate Drain

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic hot-water piping.
2. Domestic recirculating hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

B. Related Sections:

1. Division 22 Section "Plumbing Equipment Insulation."

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Indoor Piping Insulation Schedule.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, but are not limited to, the following]:

   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000-Degree Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
   d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
   d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Dow Corning Corporation; 739, Dow Silicone.
   b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
   c. P.I.C. Plastics, Inc.; Welding Adhesive.
   d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Color: White.

2.3 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
   b. Eagle Bridges - Marathon Industries; 405.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
   d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

   a. Johns Manville; Zeston.
   b. P.I.C. Plastics, Inc.; FG Series.
   c. Proto Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, but are not limited to, the following]:

   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.

3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, but are not limited to, the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.7 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, but are not limited to, the following:

a. ProFlo PF200 Series

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

O. For above-ambient services, do not install insulation to the following:

1. Testing agency labels and stamps.
2. Nameplates and data plates.
3. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

4. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
6. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
7. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, 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.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FINISHES - Painting

A. Jacket Painting not required

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water: Insulation shall be one of the following:

1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

INDOOR, FIELD-APPLIED JACKET SCHEDULE

B. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

C. If more than one material is listed, selection from materials listed is Contractor's option.

D. Piping, Concealed:

1. None.

E. Piping, Exposed:

1. None.
2. PVC 30 mils thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys.

B. Flux: ASTM B 813, water flushable.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

F. Install piping to permit valve servicing.

G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

K. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

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

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4 : 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.

E. Install supports for vertical copper tubing every 10 feet.

3.4 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.5 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

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

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.8 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

    1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
    2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

        a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
        b. Fill and isolate system according to either of the following:

            1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
            2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

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

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

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

3.9 PIPING SCHEDULE

A. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

B. Aboveground domestic water piping shall be the following:
    1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper, solder-joint fittings; and brazed joints.

END OF SECTION 221116

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SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Balancing valves.
2. Water-hammer arresters
3. Trap-Seals

B. Related Requirements:

1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Division 22 Section "Domestic Water Piping" for water meters.
3. Division 22 Section "Emergency Plumbing Fixtures" for water tempering equipment.
4. Division 22 Section "Drinking Fountains" for water filters for water coolers.
5. Division 22 Section "Remote Water Coolers" for water filters for water coolers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa)] unless otherwise indicated.

2.3 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Manufacturers: Subject to compliance with requirements:

a. Bell and Gossett Model CB

2. Calibrated Balance Valve (½" – 3")
3. Valve body shall be constructed out of lead free brass
4. Valve shall include a ball valve constructed in 304 Stainless Steel.
5. Valve shall be CSA and NSF 61certified and compliant with NSF/ANSI-372.
6. Valve body shall include two pressure/temperature ports.
7. Valve body shall include an optional drain valve port.
8. Valve shall utilize a calibrated nameplate with a memory stop.
9. Valve shall utilize a reduced port design that provides velocity head recovery.
10. Valve temperature range shall be from -4°F (-20°C) to 250°F (121°C).
11. Model CB: Valve shall have either NPTF thread or SWTF end connections.

2.4 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

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

a. AMTROL, Inc.
b. Josam Company.
c. MIFAB, Inc.
d. Precision Plumbing Products, Inc.
e. Sioux Chief Manufacturing Company, Inc.
f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
g. Tyler Pipe; Wade Div.
h. Watts Drainage Products.
i. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.5 TRAP-SEAL

A. An Elastomeric, Normally Closed Trap Guard Device utilizes a normally closed seal to prevent evaporation of the trap seal and also protect against sewer gases from backing up into habitable areas. It opens with fluid and allows liquid drainage to flow through into the building drain. Device can be installed inside other manufacturer's drain tail pieces or optionally inside 2", 3" or 4" pipe that connects the various types of floor or hub drains.

1. Manufacturers: Subject to compliance with requirements

a. ProVent Systems

2. Standard: The elastomeric membrane material shall be tested according to the CAN/CSA B602 standard requirements of sections 4.1.2, 4.1.3, 4.1.5, 4.1.6, 4.1.8, 4.1.10 & 4.1.11.
3. Back Pressure Rating: 5.2 PSF

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install balancing valves in locations where they can easily be adjusted.

B. Install trap-seal according to manufacturer's instructions.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 ADJUSTING

A. Set field-adjustable flow set points of balancing valves.

END OF SECTION 221119

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SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

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

a. ANACO-Husky.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

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

   a. ANACO-Husky.

2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Install waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
   1. Horizontal Sanitary Drainage Piping: ¼" per foot in direction of flow.
   2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

J. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

K. Plumbing Specialties:

1. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

1. Install individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

C. Support horizontal piping within 12 inches of each fitting.

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

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

3.4 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.6 CLEANING AND PROTECTION

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

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

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.7 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 221316

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SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Cast-Iron Floor Cleanouts:

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

a. Zurn Plumbing Products Group

2. Standard: ASME A112.36.2M for adjustable housing cast-iron soil pipe cleanout.
3. Size: Same as connected branch.
4. Type: Adjustable housing Cast-iron soil pipe
5. Frame and Cover Material and Finish: Polished bronze
6. Frame and Cover Shape: Round.
7. Top Loading Classification: Light Duty.

B. Cast-Iron Wall Cleanouts:

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

a. Zurn Plumbing Products Group

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Wall Access: Round deep, chrome-plated bronze cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

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

   a. Zurn Plumbing Products Group Model Z4115B

2. Standard: ASME A112.6.3
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Light Duty

2.3 FLOOR SINKS

A. Cast-Iron Floor Sinks :

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

   a. Zurn Plumbing Products Group Model Z1901

2. Pattern: 12"x12"x8" deep cast iron body and square, light duty grate with ½" slotted openings, white porcelain enamel interior and top, with white ABS anti-splash dome strainer

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts according to the drawings and as following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts concealed in walls, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall. Cleanout opening to be <= 1-1/2" from finished wall surface.

D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

   a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
   b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
   c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

E. Install trap seals on floor drains and floor sinks.

F. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

3.2 CONNECTIONS

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

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.

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

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

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

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."

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

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

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

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

END OF SECTION 221319

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Water Closet seats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

PART 2 - PRODUCTS – Refer to Plumbing Equipment Schedule on Drawings

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.

D. Install seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

3.2 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.3 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.4 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

PART 2 - PRODUCTS - Refer to Plumbing Fixture Schedule on Drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

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

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224316.13

SECTION 224216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service sinks.
2. Break room sinks
3. Sink faucets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS – See Plumbing Fixture Schedule on Drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

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

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball if supply stops are not specified with sink. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224723 - ELECTRIC WATER COOLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electric water coolers and related components.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of remote water cooler.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For remote water coolers to include in maintenance manuals.

PART 2 - PRODUCTS – Refer to Plumbing Fixture Schedule on Drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where remote water coolers will be installed.

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

3.2 INSTALLATION

A. Install electric water coolers level and plumb according to roughing-in drawings.

B. Install water-supply piping with shutoff valve on supply to each electric water cooler to be connected to domestic-water distribution piping. Use ball valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

C. Use approved wall carrier that is compatible with electric water cooler

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

E. Adjust water-cooler temperature settings.

3.3 CONNECTIONS

A. Connect fixtures with water supplies. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Install ball shutoff valve on water supply to each fixture. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

3.4 CLEANING

A. After installing electric water cooler, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

END OF SECTION 224723

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

D. Rotor: Random-wound, squirrel cage.

E. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Class B.

G. Insulation: Class F.

H. Code Letter Designation:

1. Motors 15HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15HP: Manufacturer's standard starting characteristic.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

A. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop collar.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, anti-corrosion coated, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Pipe Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

A. Description: Nonshrink, recommended for interior and exterior sealing openings in nonfire-rated walls or floors.

B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use sealants appropriate for size, depth, and location of joint.

D. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Concrete Slabs Above Grade:

a. Piping Smaller Than NPS 6: Steel-pipe sleeves.
b. Piping NPS 6 and Larger: Steel-pipe sleeves.

2. Interior Partitions:

a. Piping Smaller Than NPS 6: Galvanized-steel pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.

D. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.2 FLOOR PLATES

A. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece deep pattern.

b. Insulated Piping: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.

2. Escutcheons for Existing Piping to Remain:

a. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: Split floor plate.
2. Existing Piping to Remain: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 230518

SECTION 230519 - METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Liquid-in-glass thermometers.
2. Thermowells.
3. Dial-type pressure gauges.
4. Gauge attachments.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 SCLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Cast aluminum; 9-inch nominal size unless otherwise indicated.
3. Case Form: Adjustable angle unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
6. Window: Glass.
7. Stem: Aluminum and of length to suit installation.

   a. Design for Air-Duct Installation: With ventilated shroud.
   b. Design for Thermowell Installation: Bare stem.

8. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion in piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.3 DIAL-TYPE PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Standard: ASME B40.100.
2. Case: Liquid-filled type(s); cast aluminum or drawn steel; 6-inch nominal diameter.
3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
4. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

B. Remote-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Standard: ASME B40.100.
2. Case: Liquid-filled type; cast aluminum or drawn steel; 6-inch nominal diameter with back flange and holes for panel mounting.
3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
4. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.4 GAUGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending one-third of pipe diameter and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

H. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.

I. Install remote-mounted pressure gauges on panel.

J. Install valve and snubber in piping for each pressure gauge for fluids (except steam).

K. Install test plugs in piping tees.

L. Install thermometers in the following locations:

1. Inlet and outlet of each hydronic coil in air-handling units, fan coils, and decentralized reheat coils.
2. Outside-, return-, supply-, and mixed-air ducts.
3. Elsewhere as shown on drawings.

M. Install pressure gauges in the following locations:

1. Inlet and outlet of each hydronic coil in air-handling unit.
2. Elsewhere as shown on drawings.

3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow space for service and maintenance of meters, gauges, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gauges to proper angle for best visibility.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 100 deg F.

B. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F.

C. Scale Range for Air Ducts: 0 to 150 deg F.

3.5 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 160 psi.

B. Scale Range for Heating, Hot-Water Piping: 0 to 160 psi.

END OF SECTION 230519

SECTION 230523.12 - BALL VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B31.9 for building services piping valves.

C. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

D. Refer to HVAC valve schedule articles for applications of valves.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Handlever: For quarter-turn valves smaller than NPS 4.

H. Valves in Insulated Piping:

1. Include stem extensions.
2. Extended operating handle of nonthermal-conductive material, and protective sleeves that allow operation of valves without breaking the vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRASS BALL VALVES

A. Brass Ball Valves, Two-Piece with Full Port and Stainless-Steel Trim, Threaded Ends:

1. Subject to compliance with the requirements, provide products from one of the following:

   a. Belimo
   b. Milwaukee Valve Company
   c. NIBCO INC

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE.
   h. Stem: Stainless steel.
   i. Ball: Stainless steel, vented.
   j. Port: Full.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, Two-Piece with Full Port and Stainless-Steel Trim:

1. Subject to compliance with the requirements, provide products from one of the following:

   a. Bray Controls
   b. Milwaukee Valve Company
   c. NIBCO INC

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Bronze.
   f. Ends: Threaded.
   g. Seats: PTFE.
   h. Stem: Stainless steel.
   i. Ball: Stainless steel, vented.
   j. Port: Full.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
2. For Steel Piping, NPS 2 and Smaller: Threaded ends.

3.3 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller: Brass or bronze ball valves, two piece, with stainless-steel trim, full port, threaded-joint ends.

3.4 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller: Brass or bronze ball valves, two piece, with stainless-steel trim, and full port.

END OF SECTION 230523.12

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SECTION 230523.13 - BUTTERFLY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. High-performance butterfly valves.
2. Chainwheels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Gear Actuator: For valves NPS 8 and larger.
2. Handlever: For valves NPS 6 and smaller.
3. Chainwheel: Device for attachment to gear, stem, or other actuator of size and with chain for mounting height, according to "Valve Installation" Article.

F. Valves in Insulated Piping: With 2-inch stem extensions with extended necks.

2.2 HIGH-PERFORMANCE BUTTERFLY VALVES

A. Single-Flange, High-Performance Butterfly Valves, Class 150:

1. Subject to compliance, provide products by one of the following

a. Bray Controls

b. Milwaukee Valve Company
c. NIBCO INC

2. Description:

a. Standard: MSS SP-68.
b. CWP Rating: 285 psig at 100 deg F.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: Carbon steel, cast iron, ductile iron, or stainless steel.
e. Seat: Reinforced PTFE or metal.
f. Stem: Stainless steel; offset from seat plane.
g. Disc: Carbon steel.
h. Service: Bidirectional.

2.3 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, chain guides, chain.

1. Sprocket Rim with Chain Guides: Ductile iron, of type and size required for valve.
2. Chain: Hot-dip, galvanized steel, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for butterfly valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 and Larger:

1. High-Performance Butterfly Valves: Single flange, Class 150.

3.4 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 and Larger:

1. High-Performance Butterfly Valves: Single flange, Class 150.

END OF SECTION 230523.13

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SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Fastener systems.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 233113 "Metal Ducts" for duct hangers and supports.

1.2 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.3 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psi or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psi minimum compressive strength.

C. For Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

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

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

E. Install lateral bracing with pipe hangers and supports to prevent swaying.

F. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 1-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

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

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

I. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

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

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

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

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

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 ADJUSTING

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

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 PAINTING

A. Touchup: Comply with requirements in Section 099113 "Exterior Painting" Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

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

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
9. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
10. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
11. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

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

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

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

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

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

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

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

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

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.

3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

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SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch or stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: Match existing arrangement on other floors of the building. Coordinate with Owner.
3. Background Color: Match existing arrangement on other floors of the building. Coordinate with Owner.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless-steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Match existing arrangement on other floors of the building. Coordinate with Owner.
3. Background Color: Match existing arrangement on other floors of the building. Coordinate with Owner.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, with lettering indicating service, and showing flow direction according to ASME A13.1. Lettering content and color shall match arrangements on other floors. Coordinate with Owner

1. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Match existing arrangement on other floors of the building. Coordinate with Owner.

C. Background Color: Match existing arrangement on other floors of the building. Coordinate with Owner.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on other floors of the building. Coordinate with Owner.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

C. See drawings for additional ceiling grid labeling requirements for decentralized above ceiling HVAC equipment.

3.3 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts. Colors shall match existing conditions on other floors. Coordinate with Owner.

B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION 230553

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SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

a. Variable-flow hydronic systems.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

E. TDH: Total dynamic head.

1.3 INFORMATIONAL SUBMITTALS

A. Certified TAB reports.

1.4 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC or NEBB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC or NEBB.
2. TAB Technician: Employee of the TAB specialist and certified by AABC or NEBB as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

D. Examine equipment performance data including fan and pump curves.

1. 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.

E. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

F. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

G. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

H. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

I. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

J. Examine operating safety interlocks and controls on HVAC equipment.

K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

   a. Duct systems are complete with terminals installed.
   b. Volume, smoke, and fire dampers are open and functional.
   c. Clean filters are installed.
   d. Fans are operating, free of vibration, and rotating in correct direction.
   e. Variable-frequency controllers' startup is complete and safeties are verified.
   f. Automatic temperature-control systems are operational.
   g. Ceilings are installed.
   h. Windows and doors are installed.
   i. Suitable access to balancing devices and equipment is provided.

2. Hydronics:

   a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
   b. Piping is complete with terminals installed.
   c. Water treatment is complete.
   d. Systems are flushed, filled, and air purged.
   e. Strainers are pulled and cleaned.
   f. Control valves are functioning per the sequence of operation.
   g. Shutoff and balance valves have been verified to be 100 percent open.
   h. Pumps are started and proper rotation is verified.
   i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
   j. Variable-frequency controllers' startup is complete and safeties are verified.
   k. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in either AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and those in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

   1. After testing and balancing, patch probe holes in ducts.
   2. Upon completion of testing, the installing contractor shall restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. For variable-air-volume systems, develop a plan to simulate diversity.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Check dampers for proper position to achieve desired airflow path.

F. Check for airflow blockages.

G. Check condensate drains for proper connections and functioning.

H. Check for proper sealing of air-handling-unit components.

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge or as indicated on the drawings.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:

    a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    d. Adjust controls so that terminal is calling for minimum airflow.
    e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    f. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
    c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
9. Verify final system conditions as follows:

    a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
    b. Re-measure and confirm that total airflow is within design.
    c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
    d. Mark final settings.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures.

B. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:

    1. Check liquid level in expansion tank.
    2. Check highest vent for adequate pressure.
    3. Check flow-control valves for proper position.
    4. Check that air has been purged from the system.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. For systems with diversity:

1. Determine diversity factor.
2. Simulate system diversity by closing required number of control valves.

3. Adjust flow-measuring devices installed in mains and branches to design water flows.

   a. Measure flow in main and branch pipes.
   b. Adjust main and branch balance valves for design flow.
   c. Re-measure each main and branch after all have been adjusted.

4. Adjust flow-measuring devices installed at terminals for each space to design water flows.

   a. Measure flow at terminals.
   b. Adjust each terminal to design flow.
   c. Re-measure each terminal after it is adjusted.
   d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
   e. Perform temperature tests after flows have been balanced.

5. For systems with pressure-independent valves at terminals:

   a. Measure differential pressure, and verify that it is within manufacturer's specified range.
   b. Perform temperature tests after flows have been verified.

6. For systems without pressure-independent valves or flow-measuring devices at terminals:

   a. Measure and balance coils by either coil pressure drop or temperature method.
   b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

7. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.
8. Prior to verifying final system conditions, determine system differential-pressure set point.
9. Record final settings and verify that memory stops have been set.
10. Verify final system conditions as follows:

    a. Re-measure and confirm that total water flow is within design.

11. Verify that memory stops have been set.

3.8 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.9 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings.
    f. Settings for supply-air, static-pressure controller.
    g. Other system operating conditions that affect performance.

C. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.