PRCTI20251049

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DIVISION 01 – GENERAL REQUIREMENTS

01 10 00 – SUMMARY

A. The Project includes materials, labor, transportation, security, temporary facilities, and other items identified in, or reasonably inferable from the construction Drawings and these Specifications.

B. Definitions: For purposes of clarity within these specifications, the following definitions apply:
   1. "Tenant": Capitalized term referring to Architect's client.
   2. "Building owner": Not capitalized term referring to that entity or its representative.

C. Project Information:
   1. Project Identification: MultiCare Good Samaritan Hospital Kitchen
      a. Project Location: 401 15th Ave SE,
         Puyallup, WA 98372

   2. Building Owner: MultiCare Health System
      315 Martin Luther King, Jr. Way,
      Tacoma, WA 98405

      a. Owner's Representative: Turner & Townsend
         920 Fifth Avenue,
         Seattle, WA, 98104
         Contact: Jennifer Everett
         Jennifer.Everett@turntown.com

      b. Contractor: Abbott Construction
         3408 1st Ave S,
         Seattle, WA 98134

D. Work Covered by Contract Documents:
   1. The Work of the Project is defined by the Contract Documents and consists of the following:
      a. Tenant Improvement Office
   2. Type of Contract:
      a. Project will be constructed under a single prime contract.

E. Construction Drawings:
   1. Architectural and Engineering Drawings are complementary to each other. Contractor, Subcontractors, and vendors shall accept Architectural and Engineering Drawings and include all work necessary to achieve a complete working installation for any device or equipment which may be shown on one Drawing but not shown on another. Subcontractors are not permitted to exclude portions of the complementary Drawing subset.
   2. Where elements are indicated or described in any Drawing, it is the intent that all related construction associated with such elements is to be included in order to result in a complete installation. The same criteria apply to demolition and new construction.
   3. Dimensions shown are finish face to finish face unless noted otherwise.
   4. Vertical dimensions shown are above the finished floor or below finished ceiling unless noted otherwise. When the floor elevation varies at locations where elements horizontal to the floor plane are to be installed (such as millwork, drywall, soffits, movable or demountable partitions, etc.), the vertical dimension shown is to be maintained at the point of highest floor elevation and the element is to be installed level. Where the floor elevation varies greater than 1/4 inch in 10 feet, obtain a clarification from Architect regarding the height above the floor that the element in question is to be installed.
   5. Architectural locations and dimensions shall take precedence over Engineering Drawings for locations of wall and floor outlets, light fixtures, plumbing fixtures, and other similarly noted items. Floor outlets are to be located by dimension. No outlets are to be installed back-to-back (offset by one stud). Unless noted otherwise, new wall outlets in walls abutting the exterior enclosure are to be located per typical dimensions indicated on plan (from face of exterior enclosure drywall sill). All other outlets are to be scaled for location unless dimensioned or noted otherwise.

F. Specifications: Imperative language is used generally in the Specifications. Except as otherwise indicated or specified, requirements expressed imperatively are to be performed by Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe the responsibilities which must be fulfilled either indirectly by Contractor or, when so noted, by other entities as indicated.

G. Owner-Furnished Work:
   1. Items noted NIC (Not in Contract) will be supplied and installed by building owner, Contractor or others as indicated, concurrent with or after Substantial Completion.

H. Project Warranty: Refer to the Construction Services Agreement for warranty provisions applicable to this Contract.
   1. Project warranty period is governed by the State in which the Project is located state statutes and other provisions of the Construction Services Agreement.

I. Tenant Occupancy During Construction: The project Tenant may occupy all or a portion of the work area, and other tenants may occupy adjacent portions of the existing building during the entire construction period.
   1. Construction Operations: Minimize interference with normal functioning of building and occupants.
   2. Limit noise. If construction activities produce noise which is detrimental to the operation of the facility, schedule these activities during non-occupied hours.
   3. Do not impede emergency building evacuation with construction, equipment, materials, and procedures at building entrances and exits.
   4. Protect entrances, exits, walkways, and other areas in the vicinity of construction.
   5. Except as specifically indicated in the Contract Documents, do not permit interruption of mechanical and electrical services, shut down of building systems, services, and utilities without prior approval of building owner or Owner's Project Manager.

J. Construction Operations: Limited to tenant finish lease space indicated on Drawings, unless otherwise specifically indicated on Drawings.
   1. Additional work scope may include but not be limited to multi-tenant corridors, minor exterior or roof-top improvements, and other non-tenant common area as specifically noted on Drawings; identify cost of such work scope separately from tenant finish lease space.

K. Delegated Design: Design of building systems, or components of systems, specified to be provided by Contractor. See Section 01 40 00 for additional delegated design requirements. Systems, or components of systems, include:
   1. Acoustical ceilings
   2. Mechanical systems.
   3. Plumbing systems.
   4. Electrical systems.
   5. Fire sprinkler systems.
   6. Fire alarm systems.
   7. Telecommunications systems.
   8. Ceiling system including suspended system and seismic restraints
   9. Other electronic safety and security systems indicated on Drawings.

L. Contractor Duties:
   1. Except as specifically noted, provide and pay for:
      a. Labor, materials, and equipment.
      b. Tools, construction equipment and machinery
      c. Water, heat, and utilities required for construction.
      d. Other facilities and services necessary for proper execution and completion of work.
      e. Testing

M. Comply with all applicable local Building Codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.

01 20 00 - PRICE AND PAYMENT PROCEDURES

A. Applications for Progress Payments:
   1. Payment Period: As stipulated in construction Services Agreement, or as otherwise specified in Tenant's lease.
   2. Form: Contractor's electronic media driven form acceptable to Owner, including continuation sheets when required.
   3. Execute certification by signature of authorized officer.
   4. Use data from the approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.
   5. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
   6. Provide backup data as necessary for Architect to review Applications for Payment. If multiple items must be tabulated to arrive at a scheduled value, provide a worksheet to indicate these calculations.
   7. Submit e-mail digital copies of each Application for Payment.
   8. Include the following with the application:
      a. Construction progress schedule revised and current as specified in Section 01 30 00.
      b. Unless otherwise restricted by Tenant's lease agreement, provide conditional release of liens from each Subcontractor and vendor for the current month's payment application, and unconditional release of liens from each Subcontractor and vendor for the previous month's payment application.
      c. Affidavits attesting to off-site stored products, if any.
   9. When Architect requires substantiating information, submit data justifying dollar amounts in question.

B. Application for Final Payment:
   1. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
   2. Application for Final Payment will not be considered until the following have been accomplished:
      a. Closeout procedures specified in Section 01 70 00.
      b. Receipt of final Certificate of Occupancy from jurisdictional authority.
      c. Acceptance or Work by Owner and Architect.

C. Modification Procedures:
   1. Requests for Information: Use for requesting supplemental information or an interpretation of the Contract Documents. Contractor is required to research the Contract documents thoroughly and only request information or an interpretation for an item that is not clearly indicated in, or reasonably inferable from, the Contract Documents.
      a. Allow number of calendar days as stipulated in Construction Services Agreement for Architect to provide a response to requests for information, and number of calendar days as stipulated in Construction Services Agreement when response includes the Architect’s consultant.
      b. Architect's response to a request for information does not constitute a modification of the Contract Documents if response is generally consistent with work scope and intent of Contract Documents.
      c. If a response requires a modification of the Contract Documents, prepare a request for change order or other modification according to applicable modification procedures specified.
   2. Supplemental Instructions: For minor modifications not involving an adjustment to the Contract Sum or Contract Time; Architect will issue instructions directly to Contractor.
      a. Architect's issuance of supplemental instructions may constitute a modification of the Contract Documents involving an adjustment to the Contract Sum or Contract Time. If Architect's supplemental instructions require such a modification of the Contract Documents, prepare a request for change order or other modification according to applicable modification procedures specified in this Section.
   3. Proposal Request: For modifications for which advance pricing is desired, Architect will issue a document which includes a detailed description of a proposed modification with supplementary or revised drawings and specifications, a modification in Contract Time for executing modification. The contractor shall prepare and submit a fixed price quotation within the number of working days as stipulated in the Construction Services Agreement.
   4. Contractor may propose a change by submitting a request for change order or modification to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.
   5. Computation of Change in Contract Amount: As specified in the Construction Services Agreement.
   6. Execution of Change Orders: Contractor will issue Change Orders for signatures of parties as provided in the Construction Services Agreement
   7. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
   8. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

9. Promptly enter changes in Project Record Documents.

D. Allowances:
   1. Include scheduled allowances in the project cost; allowance is for cost of materials only, delivered and unloaded at the site. Installation and all other costs are to be included in the base price and separate from allowance amounts.
   2. Submit invoices to indicate actual quantities of materials delivered and costs. Indicate amounts of applicable trade discounts.
   3. Schedule of Allowances:
      a. Allowance No. 1. (Lump-sum cost proposal) Include: budget amount for replacing existing receptionist desk on Level 3 as specified in Section 06 60 00 Decorative Plastic Fabrications, and as shown on the drawings.

01 30 00 - ADMINISTRATIVE REQUIREMENTS

A. General Submittal Procedures:
   1. Provide a web-based portal access project management system for processing all RFI's and Submittals.
      a. Provide direct log in access for Architect, Architect's consultants, and Owner.

   2. Transmit each submittal with a copy of the approved submittal form.
      a. Submittal Format: Electronic, except sample submittals.
      b. Sample Submittals: Submit as physical submittals as specified.

   3. Submittal Schedule: Establish and maintain a submittal schedule, numbering each submittal by corresponding Specification Section number, and clearly identifying all submittals with project name.
      a. Coordinate submittal schedule with Contractor’s construction progress schedule.
      b. Schedule submittals to expedite the Project, and coordinate submission of related items.
      c. For each submittal for review, allow the number of calendar days as stipulated in the Construction Services Agreement for review, excluding delivery time from and back to Contractor.
      d. The contractor is required to identify submittals that require expedited review and Architect's action in submittal schedule and shall notify Architect when review completion is required prior to sending those submittals to Architect for review.
   4. Special Submittal Restrictions:
      a. Submittals not requested may not be recognized or processed.
      b. Submittals not reviewed and approved by Contractor before submitting to Architect may be rejected and may not be reviewed by Architect until Contractor's review and approval is complete. Claims for delay as the result of submittals not reviewed by Contractor may not be allowed.
   5. Submittal Review Stamps:
      a. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittals provided without Contractor's review will be subject to rejection without Architect's review.
      b. Provide space for Contractor, Architect, and consultant review stamps.
   6. Manufacturer's Catalog Submittals: If manufacturer's published catalog that is specifically applicable to the proposed products for this Project.
   7. Resubmittals:
      a. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
      b. When revised for resubmission, identify all changes made since previous submission.
      c. Make resubmissions under procedures specified for initial submittals.
   8. Submittal Distribution: Distribute reviewed and approved submittals to all affected parties. Instruct parties to promptly report any inability to comply with indicated requirements.

B. Submittals - Architect's Action:
   1. Architect will review each submittal, mark it with appropriate "action," and return to Contractor within 5 working days or as mutually agreed between Architect and Contractor for initial review, and 2 calendar days for each resubmittal.
   2. Where submittals include materials, products, systems, or manufacturers not specified, approved by Addendum prior to execution of the Contract, Architect reserves the right to exceed the specified time allowance to allow sufficient time to determine the acceptability of such items, and no claim for delay by Contractor will be allowed.
   3. Where submittals include a material, product, system, or manufacturer substitution which has not been previously accepted or approved in writing, Architect reserves the right to reject such submittal and require a compliant submittal or may direct that other action be taken by Contractor to achieve compliance with Contract Documents, and no claim for delay by Contractor will be allowed.
   4. Where submittals approved by Architect may include a material, product, or system that is in error, inconsistent with intent of Contract Documents, or may be incorrectly specified by Contractor's delegated design subcontractor, Architect is not responsible for consequences of any kind.
   5. Architect's review is for general conformance only and does not relieve Contractor from full compliance with the Contract Documents.

C. Submittals for Review:
   1. When the following are specified in individual Sections, submit them for review:
      a. Product data.
      b. Shop drawings.
      c. Samples for selection.
      d. Samples for verification.
      e. Other types specified.

2. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
3. Samples will be reviewed only for aesthetic, color, or finish selection as applicable.
4. Coordinate submittals into logical groupings to facilitate interrelation of the several items:
    a. Submit a complete package of specified submittals for each product or system, generally associated with an individual specification Section. Partial submittals will not be reviewed, and no delay claim will be considered as the result of a partial submittal being returned for proper resubmittal.
    b. Submit interior finishes samples and product data as a single package, including but not limited to finishes items specified in Divisions 09, 10, and 12.
    c. Submit all door, frame, and hardware product data, schedules, and other specified submittal information in a single package as specified in Division 08.

D. Submittals for Information:
1. When the following are specified in individual Sections, submit them for information:
    a. Design data.
    b. Certificates.
    c. Test reports.
    d. Inspection reports.
    e. Manufacturer's instructions.
    f. Manufacturer's field reports.
    g. Other types specified.
2. Submit for Architect's knowledge as contract administrator for Architect. No action will be taken.

E. Submittals for Project Closeout:
1. When the following are specified in individual Sections, submit them at project closeout:
    a. Project record documents.
    b. Operation and maintenance data.
        i. Prepare and submit operation and maintenance manuals for building operating systems and equipment.
        ii. Prepare and submit instruction manuals covering the care, preservation, and maintenance of architectural products and finishes.
    c. Maintenance materials: for list of specific maintenance materials required, see MAINTENANCE MATERIALS at end of specifications below.
    d. Warranties.

F. Construction Progress Schedule:
1. Within 7 days after date of the Agreement or as required by Owner's authorized representative, submit preliminary schedule for the Work.
2. If the preliminary schedule requires revision after review, submit a revised schedule within 3 days.
3. Within 3 days after joint review, submit complete schedule.
4. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
5. Submit updated schedule as may be necessary from time-to-time Design data. Indicate work that is leading and lagging behind the critical path of the approved schedule and propose remedies to achieve approved schedule.

G. Project Meetings:
1. Except as otherwise indicated, schedule and conduct meetings.
2. Preconstruction Conference: Architect will schedule and conduct the preconstruction conference.
3. Project Closeout Conference: No later than 30 days prior to the scheduled date of Substantial Completion.
4. Progress Meetings: At regular intervals, coordinated with preparation of payment requests.
5. Preinstallation Conferences: Before each construction activity that requires coordination.
6. Coordination Meetings: At regular intervals, in addition to specific meetings held for other purposes.

01 32 33 – PHOTOGRAPHIC DOCUMENTATION

A. Digital Photographs: Submit image files within three days of taking photographs.
   1. Submit photos electronically. Include copy of key plan indicating each photograph's location and direction.
   2. Identification: Provide the following information with each image description in a web-based Project management software site:
      a. Name of Project.
      b. Name of Contractor.
      c. Date photograph was taken.
      d. Description of location, vantage point, and direction.
      e. Unique sequential identifier keyed to accompanying key plan.
   3. Formats and Media:
      a. Digital Photographs: Provide color images in JPG format. Photographs should be clear, free from obstruction with appropriate lighting, and easily viewable.
      b. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   4. Construction Photographs:
      a. General: Take photographs with maximum depth of field and in focus.
      b. Maintain key plan with each set of construction photographs that identifies each photographic location.
      c. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
      d. Take photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
   5. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work.
   6. Periodic Construction Photographs: Take photographs at weekly intervals coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show the status of construction and progress since the last photographs were taken.
   7. Final Completion Construction Photographs: Take photographs after the date of Substantial Completion for submission as Project Record Documents. Architect will inform photographers of desired vantage points.
   8. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
      a. Three days' notice will be given, where feasible.
      b. In emergency situations, take additional photographs within 24 hours of request.

01 40 00 - QUALITY REQUIREMENTS

A. Quality Control: Maintain quality control over subcontractors, subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality according to the requirements of the Contract Documents.

B. Quality Assurance:
   1. Become completely familiar with applicable requirements of codes and regulations.
   2. Verify that materials and equipment used in the Work meet or exceed code requirements.

C. References and Standards:
   1. For products and workmanship specified by reference to a document or documents not included in the specifications, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
   2. Conform to reference the standard of date of issue current on date of Contract on date of Contract Documents, except where a specific date or edition is established by applicable code.
   3. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

D. Delegated Design Requirements:
   1. Performance and Design Requirements: Where professional design services or certifications by a licensed design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with performance and design requirements specified in individual specification Sections.
   2. If specified performance or design requirements are not sufficiently complete to perform required services or provide required certifications, submit a written request for additional information to Contractor.
   3. Refer to Section 01 10 00 for a listing of specification Sections that include delegated design requirements.
   4. Delegated-Design Submittals: For products indicated to comply with performance requirements and design criteria, include analysis data signed and sealed by Structural (Professional) Engineer licensed in the jurisdiction of the State of Washington and responsible for their preparation.

E. Mock-Ups:
   1. Assemble and erect individual system or product mock-ups as specified individual specification Sections.
   2. Accepted mock-ups shall be a comparison standard for the remaining Work.

01 50 00 - TEMPORARY FACILITIES AND CONTROLS

A. Temporary Barriers:
   1. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, and to protect existing facilities and adjacent areas from damage from construction operations.
   2. Protect vehicles, stored materials, site, and structures from damage.
   3. Protect freight/service elevators or other facilities used to deliver or remove materials as outlined in the building owner's rules, regulations, and construction procedures.

B. Temporary Utilities:
   1. Contractor or building owner will provide the following:
      a. Electrical power and metering, consisting of connection to existing facilities.
      b. Water supply, consisting of connections to existing facilities.

C. Temporary Sanitary Facilities:
   1. Use of existing facilities is not permitted unless otherwise permitted by the building owner in the building owner's rules, regulations, and construction procedures.

D. Waste Removal:
   1. Provide waste removal facilities and services as required to maintain the construction area in clean and orderly condition.
   2. Provide containers with lids. Remove trash from site daily.
   3. Materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

01 60 00 - PRODUCT REQUIREMENTS

A. Existing Products:
   1. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
   2. Existing materials and equipment indicated to be removed but not to be re-used, relocated, reinstalled, delivered to the Contractor or building owner, or otherwise indicated to remain the property of the Contractor or building owner, shall become the property of the Contractor; remove from site. If not stated in the building owner's rules and regulations, obtain clarification from the building owner.

B. New Products:
   1. Provide new products unless specifically required or permitted by the Contract Documents.
   2. Do not use products having any of the following characteristics:
      a. Made using or containing CFC's or HCFC's.
      b. Containing lead, cadmium, asbestos.
      c. VOC restricted products as specified in individual specification Sections.

C. Samples: Material samples shall be sent to client and Architect for approval.

D. Product Options:
   1. Products Specified by Reference Standards or by Description Only: Use product meeting those standards or description.
   2. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
   3. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
   4. Products Specified by Naming a Basis of Design Manufacturer or Product with a Provision for Substitutions: Submit a request for substitution for any other manufacturer listed under Other Acceptable Manufacturers, or for a manufacturer not named.

E. Substitution Procedures:
   1. Substitutions are required to be verified by client, client's project manager, and Architect.
   2. Architect may consider requests for substitutions when one or more of the following conditions exist, as determined by Architect. If one or more of the following conditions are determined not to exist, Architect may not consider request further and may take no action except to record the request and its non-compliance. Consideration may be made if substitution request:
      a. Offers Owner substantial advantage in cost, time, energy conservation, or other consideration, after deducting additional responsibilities Owner must assume as the result.
      b. Is consistent with intent of Contract Documents and will produce intended work results.
      c. Is fully documented and properly submitted.
      d. Will not adversely affect Contractor's construction schedule.
      e. Becomes unavailable through no fault of the Contractor.
      f. Cannot be provided within the Contract Time; Architect will not consider substitution if Product cannot be provided as the result of Contractor's failure to schedule and coordinate the Work as required by Contract Documents.
   3. Substitutions for Convenience: Not Allowed, unless otherwise indicated.
   4. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
   5. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
   6. Substitution Submittal Procedure:
      a. Submit one digital copy of request for substitution for consideration. Limit each request to one proposed substitution.
      b. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
      c. The Architect will notify the Contractor in writing of decision to accept or reject request.

F. Storage and Protection of Products:
   1. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
   2. Store and protect products in accordance with manufacturers' instructions.
   3. Provide the proper environmental conditions for all materials to be installed. Allow for adequate time for materials to "acclimatize" to job site conditions prior to installing. Provide adequate protection at areas

which may be exposed to exterior environmental conditions to avoid temperature and humidity fluctuations in interior materials (new and existing/installed or stored).
4. Provide bonded off-site storage and protection when the site does not permit on-site storage or protection.
5. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

G. Coordination:
1. Coordinate affected work as necessary to integrate work of approved comparable products and approved substitutions.

H. Product Warranty:
1. 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.
   a. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   b. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for the Owner.
2. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   a. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   b. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   c. See other Sections for specific content requirements and particular requirements for submitting special warranties.

01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

A. General Installation Requirements:
   1. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
   2. Install products as specified in individual Sections and in accordance with manufacturer's instructions and recommendations.
   3. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
   4. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
   5. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
   6. Make neat transitions between different surfaces, maintaining texture and appearance.

B. Protection of Installed Work:
   1. Protect installed work from damage by construction operations.
   2. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
   3. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
   4. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
   5. Failure to protect installed and existing work may result in the withholding of payments to Contractor as determined by Architect. Damage resulting from failure to protect installed and existing work must be fully repaired or replaced as applicable to the satisfaction of Architect at no additional cost to Owner.

C. Protection of Final Cleaning:
   1. General Project Requirement: Cleaning materials, products, and applications must be Green Seal-compliant; materials, products, and applications that are not Green Seal- compliant are not permitted.
   2. Maintain areas free of waste materials, debris, and rubbish. Maintain the site in a clean and orderly condition.
   3. Remove debris and rubbish from wall cavities, pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
   4. Broom and vacuum clean interior areas prior to the start of surface finishing and continue cleaning to eliminate dust.
   5. Execute final cleaning after Substantial Completion but before making final application for payment.
   6. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
   7. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
   8. Replace filters of operating equipment with new filters.
   9. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
   10. Clean Architect-occupied areas of work.

D. Closeout Procedures:
   1. Notify Architect in writing when work is considered ready for Substantial Completion.
      a. Contractor's punch needs to be complete before Substantial Completion.
      b. Prerequisite for Substantial Completion: In addition to definition of Substantial Completion in the Owner to fully occupy or utilize tenant space for intended use in all respects.
   2. Accompany Architect and Tenant on preliminary final inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.
   3. Make submittals that are required by governing or other authorities.
   4. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
   5. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Architect-occupied areas.
   6. Notify Architect when work is considered finally complete.
   7. Complete items of work determined by Architect's final inspection.

01 73 29 - CUTTING AND PATCHING RESTRICTIONS

A. Cutting:
   1. Whenever possible, execute the work by methods that avoid cutting or patching.
   2. Perform whatever cutting and patching is necessary to:
      a. Complete the work.
      b. Fit products together to integrate with other work.
      c. Provide openings for penetration of mechanical, electrical, and other services.
      d. Match work that has been cut to adjacent work.
      e. Repair areas adjacent to cuts to required condition.
      f. Repair new work damaged by subsequent work.
      g. Remove samples of installed work for testing when requested.
      h. Remove and replace defective and non-conforming work.
   3. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
   4. Employ skilled and experienced installers to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
   5. Cut rigid materials, resulting in clean and neat edges, using masonry saw or core drill. Cutting rigid materials using chisels, impact or pneumatic tools is not allowed without prior approval.
   6. For assemblies with existing warranties, obtain and follow instructions from manufacturers to maintain warranty after cutting and patching.
   7. Restore work with new products in accordance with requirements of Contract Documents.
   8. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
   9. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 13 and 07 84 43 to full thickness of the penetrated element.

B. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish the entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

01 78 39 – PROJECT RECORD DOCUMENTS

A. Items submitted to Architect for review prior to distribution to Owner:
   1. Marked-up copies of Contract Drawings.
   2. Addenda and Change Orders.
   3. Record information on Work that is recorded only schematically, when part of record documents.
   4. Complete set of RFI's.

B. Items delivered directly to Owner:
   1. Orders.
   2. Marked-up copies of Shop Drawings.
   3. Marked-up Product Data submittals.
   4. Record Samples.
   5. Field records for variable and concealed conditions.
   6. Project photographs.
   7. Copies of change orders, submittal, substitutions, warranties and other forms that are part of this Project.

C. Record Documents: During construction, maintain a set of prints of Contract Documents, including drawings, specifications, and Shop Drawings.
   1. Mark Record Documents to identify changes and as-built conditions clearly.
      a. Mark record drawings to show the actual installation where the installation varies from the installation shown originally.
      b. Where Shop Drawings are used, cross-reference the corresponding location on the Contract Drawings.
      c. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
      d. Furnish As-Built drawings to the Architect at substantial completion.
      e. Note alternate numbers, change-order numbers, and similar identification.
   2. Responsibility for Markup: The individual or entity who obtained record data, whether the individual or entity is the Installer, subcontractor, or similar entity, shall prepare the markup on record drawings.
   3. Submit PDF electronic files of scanned record documents to the Owner. Include all documents, whether changes were made or not.

D. Record Drawings: Compile PDF electronic drawing sets.

E. Record Specification: One PDF electronic file.

F. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

G. Miscellaneous Record Submittals: Categories of requirements resulting in miscellaneous records specified in other Sections.

01 79 00 – DEMONSTRATION AND TRAINING

A. Complete training program shall be developed by the Contractor for systems and machinery installed at the Project and to be operated by Owner's personnel. Training program, in its entirety, shall become property of the Owner.

DIVISION 02 - EXISTING CONDITIONS AND DEMOLITION

02 10 00 - EXISTING CONDITION DOCUMENTATION

A. Existing Facility Record Drawings:
   1. A copy may be available upon request; inquire of Architect or building owner regarding existence and availability of record drawings, if any.
   2. Contractors are required to visit the existing facility and become acquainted with existing conditions.
   3. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only. Confirm all dimensions on plans specifically noted as "Field Verify"
      a. Verify that construction and utility arrangements are as shown.
      b. Report discrepancies to Architect before disturbing existing installation.
      c. Beginning of Work constitutes acceptance of existing conditions.

02 26 00 – HAZARDOUS MATERIALS

A. Hazardous Materials: If hazardous materials are discovered during tenant finish operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
   1. Comply with 29 CFR 1926 and state and local regulations.
   2. The owner will remove hazardous materials under separate contract.

02 41 19 – SELECTIVE STRUCTURE DEMOLITION

A. General:
   1. Demolition and removal of selected portions of building or structure, including salvaging of existing items.
   2. Definitions
      a. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
      b. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
      c. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
      d. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
   3. Submittals:
      a. Schedule of Selective Demolition Activities indicating:
         i. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure building manager's and building tenants' on-site operations are uninterrupted.
         ii. Interruption of utility services. Indicate how long utility services will be interrupted.
         iii. Coordination for shutoff, capping, and continuation of utility services.
         iv. Use of elevator and stairs.
         v. Locations of proposed dust- and noise-control temporary partitions and means of egress.
         vi. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
         vii. Means of protection for items to remain and items in path of waste removal from building.
   4. Quality Assurance:
      a. Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
      b. Standards: ANSI A10.6 and NFPA 241.
   5. Project Conditions
      a. The owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
      b. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
      c. Notify Architect of discrepancies between existing conditions and Drawings before proceeding.
      d. Hazardous Materials: It is unknown whether hazardous materials will be encountered in Work.
         i. If materials suspected of containing hazardous materials are encountered, do not disturb; Refer to Section 02 26 00 - Hazardous Materials.
      e. Storage or sale of removed items or materials on-site is not permitted.
      f. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations. Maintain fire-protection facilities in service during selective demolition operations.
B. Execution:
   1. Examination
      a. Verify that utilities have been disconnected and capped.
      b. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
      c. Inventory and record condition of items to be removed and reinstalled or salvaged.
      d. When unanticipated elements that conflict with intended function or design are encountered, investigate and measure nature and extent of conflict. Promptly submit a written report to Architect.
      e. Perform surveys as Work progresses to detect hazards resulting from selective demolition activities.
   2. Utility Services and Mechanical/Electrical Systems
      a. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
         i. Comply with requirements for existing services/systems interruptions.
      b. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
         i. Building manager will arrange to shut off indicated services/systems when requested by Contractor.
         ii. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
         iii. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing. Where the entire wall is to be removed, existing services/systems to be removed with removal of wall.
   3. Preparation
      a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

i. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
ii. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
iii. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
iv. Cover and protect furniture, furnishings, and equipment that have not been removed.
v. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

4. Selective Demolition, General
   a. Demolish and remove existing construction only to extent required by new construction and as indicated. Comply with requirements of Section 01 73 29 - Cutting and Patching. Use methods required to complete Work within limitations of governing regulations and as follows:
      i. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
      ii. Cut or drill from exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
      iii. Do not use cutting torches until the work area is cleared of flammable materials. At concealed spaces, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
      iv. Maintain adequate ventilation when using cutting torches.
      v. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
      vi. Remove structural framing members and lower to the ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
      vii. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
      viii. Dispose of demolished items and materials promptly
   b. Removed and Salvaged Items:
      i. Clean salvaged items.
      ii. Pack or crate items after cleaning. Identify contents of containers.
      iii. Store items in secure area until delivery to Owner.
      iv. Transport items to Owner’s storage area on-site designated by Owner.
      v. Protect items from damage during transport and storage.
   c. Removed and Reinstalled Items:
      i. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
      ii. Pack or crate items after cleaning and repairing. Identify contents of containers.
      iii. Protect items from damage during transport and storage.
      iv. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
   d. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
5. Disposal of Demolished Materials
   a. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner’s property, remove demolished materials from Project site and legally dispose of them.
      i. Do not allow demolished materials to accumulate on-site.
      ii. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
      iii. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   b. Transport items to Owner’s storage area on-site designated by Owner.
   c. Protect items from damage during transport and storage.
6. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

02 41 19 16 – SELECTIVE INTERIOR DEMOLITION

A. Alterations Procedures:
   1. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
      a. Provide, erect, and maintain temporary dustproof enclosures.
   2. Remove existing work as indicated and as required to accomplish new work.
      a. Where electrical floor boxes, poke-throughs, conduit, plumbing, piping, or other equipment or devices are removed, fire-seal floor penetrations. Refer to structural drawings for holes greater than 1-1/2 inches in diameter and Division 07 (Thermal and Moisture Protection) for firestopping of smaller openings. Coordinate interrelated subcontractor work associated with firestopping and filling floor openings.
      b. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
      c. Remove all residual base adhesive remaining after demolition of base. Prepare the wall surface as required for specified finish.
   3. Existing Facility Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
      a. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
      b. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
      c. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
         i. Disable existing systems only to make switchovers and connections; minimize duration of outages. Provide 5 days advance notice to Owner of any planned outages.
         ii. Provide temporary connections as required to maintain existing systems in service.
      d. Verify that abandoned services serve only abandoned facilities.
      e. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
      f. Ensure that existing fire-rated and smoke-resistant partitions to remain are constructed accordingly and make repairs or corrections needed to ensure functional integrity.
      g. Some existing fire-rated partitions may be de-rated. Refer to drawings for location(s). Items such as existing fire or fire-smoke dampers shall be demolded and above ceiling labels changed.
   4. Protect existing work to remain.
      a. Prevent movement of structure; provide shoring and bracing if necessary.
      b. Perform cutting to accomplish removals neatly and as specified for cutting new work.
      c. Repair adjacent construction and finishes damaged during removal work.
   5. Adapt existing work to fit new work. Make as neat and smooth a transition as possible. Comply with requirements of Section 01 73 29 - Cutting and Patching Restrictions.
      a. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
      b. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
      c. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
      d. Trim existing wood doors as necessary to clear the new floor finish. Refinish the trim as required.
   6. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish. Comply with requirements of Section 01 73 29 - Cutting and Patching Restrictions.
   7. Refinish existing surfaces as indicated:
      a. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
      b. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
   8. Clean existing systems and equipment.
   9. Remove demolition debris and abandoned items from alterations areas and dispose of off-site.

02 50 00 - EXISTING STRUCTURE LIMITATIONS

A. Existing Structure Limitations:
   1. Existing Building Structure: Protect existing building structural elements indicated to remain. Alteration of existing building structural elements is strictly prohibited, unless specifically indicated otherwise on Drawings. If existing structural elements must be modified to complete design intent, notify Architect for direction and possible modifications that may be required by the Structural Engineer.
   2. Core Drilling: Core drill slabs as required to install new items as detailed on Drawings. If required based on existing slab conditions or by building owner's construction rules and regulations, employ methods of detecting existing tensioned and un-tensioned reinforcing, and other embedded items, that will not be hazardous to humans or damage Owner's existing facilities and equipment. If the building owner has specific requirements, comply with those requirements.
   3. Powder-actuated Fasteners and Post-installed Anchors: Verify existing slab conditions employing methods of detection specified for core drilling; locate fasteners and anchors to avoid structural damage to existing slabs and existing tensioned reinforcing. See structural Drawings for additional requirements and limitations. Avoid exceeding allowable floor loading capacity at any location by any construction process and specifically by the moving and storage of
      a. construction materials or operation of any hoist, vehicle or crane device. Obtain floor capacities from building owner.

SECTION 03 11 00 CAST-IN-PLACE CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Design, construction, and safety of formwork for cast-in-place concrete.
- B. Furnish and install required formwork ready for pouring of concrete.
- C. Strip and dispose of formwork.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 36 00 – DELEGATED DESIGN REQUIREMENTS: for bidder design requirements.
- C. Section 03 21 00 - REINFORCING STEEL: for placement of reinforcing steel.
- D. Section 03 30 00 - CAST-IN-PLACE CONCRETE: for placing concrete and finish requirements.
- E. Section 05 50 00 - METAL FACBRICATIONS: for items to be embedded.
- F. Section 31 20 00 - EARTHWORK: for capillary break under slab-on-grade.

1.3 REFERENCES
- A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
- B. American Concrete Institute (ACI):
  1. ACI SP-4, Formwork for Concrete.
  2. ACI 117, Specifications for Tolerances for Concrete Construction and Materials.
  3. ACI 301, Specifications for Structural Concrete for Buildings.
  4. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
  5. ACI 305, Hot Weather Concreting.
  6. ACI 306, Cold Weather Concreting.
  7. ACI 309, Recommended Practice for Consolidation of Concrete.
  8. ACI 318, Building Code requirements for Reinforced Concrete.

1.4 QUALITY ASSURANCE
- A. Design, erect, shore, brace, and maintain formwork in accordance with ACI SP-4.
- B. Tolerances: Within limits of ACI 117.

PART 2 - PRODUCTS

2.1 FORM MATERIALS
- A. Wood, metal, or plastic as arranged by Contractor. Forming material shall be compatible with finish requirements for concrete to be left exposed or to receive decorative finish.

2.2 ACCESSORIES
- A. Release agents used shall be compatible with finish requirements.

PART 3 - EXECUTION

3.1 PREPARATION
- A. Unless new, clean forms of loose concrete and other debris from previous use and repair to proper condition.

3.2 RE-USE OF FORMS
- A. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints.
- B. Align and secure joint to avoid offsets.
- C. Do not use forms that have been “patched” where concrete surfaces will be exposed to view in the finished Work without prior written approval from Architect.

3.3 INSTALLATION

A. Forms -

1. Conform to shape, lines, and dimensions indicated on Drawings and concrete tolerances specified in Section 03 30 00.
2. Be sufficiently tight to prevent leakage and fabricated for easy removal without requiring hammering or prying against concrete surfaces.
3. Be properly braced and tied. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Securely brace temporary openings and set tightly to prevent loss of concrete mortar.
4. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
5. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
6. Provide temporary openings at base of tall forms to facilitate cleaning, placement of concrete and inspection. Locate temporary openings on forms at inconspicuous locations.
7. Provide openings in concrete formwork to accommodate Work of other trades. Determine size and location of openings, recesses and chases from trades providing such items.
8. Make proper form adjustments before, during, and after concreting.

B. Accessories -

1. Provide for installation of inserts, templates, fastening devices, and other accessories to be set in concrete prior to placing.
2. Accurately place and securely support items built into forms.

C. Form-Coating Material –

1. Coat contact surfaces with a form-coating material before reinforcement is placed.
2. Apply in accordance with manufacturer’s printed instructions.
3. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.
4. Coat steel forms with non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 REMOVAL OF FORMS

A. Form work not supporting weight of concrete, such as sides of beams, walls, columns and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 48 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations.

B. Form work supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than three (3) days and until concrete has attained 100 percent of its 28-day design minimum compressive strength.

1. Method to Determine Potential Compressive Strength: Test field-cured specimens representative of concrete location or members.
2. If no 3-day test specimens are tested, maintain formwork for not less than seven (7) days and test to determine that the concrete has attained 100 percent of its minimum 28-day design compressive strength.

C. Form facing material may be removed four (4) days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.5 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new form work.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets.

C. Do not use forms that have been “patched” where concrete surfaces will be exposed to view in the finished Work without prior written approval from Architect.

END OF SECTION

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SECTION 03 21 00 REINFORCING STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnishing, bending, and installing reinforcing as described in Contract Documents.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: for submittal procedures.
C. Section 03 31 00 - CONCRETE FORMWORK: for concrete formwork to receive reinforcing steel.
D. Section 03 30 00 - CAST-IN-PLACE CONCRETE: for placing concrete.
E. Section 05 50 00 - METAL FACBRICATIONS: for items to be embedded.
F. Section 07 26 00 - VAPOR RETARDERS: for under-slab vapor retarder.
G. Section 31 20 00 - EARTHWORK: for capillary break under slab-on-grade.
H. STRUCTURAL DRAWINGS: for additional requirements.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. American Concrete Institute (ACI):
   1. ACI 315: Details and Detailing of Concrete Reinforcement.
   1. ACI 318: Building Code Requirements for Structural Concrete.
C. ASTM International (ASTM):
   1. ASTM A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   2. ASTM A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
   3. ASTM A615/A615M: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
D. Concrete Reinforcing Steel Institute (CRSI):
   1. Manual of Standard Practice.

1.4 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.
B. Product Data: For each type of product indicated.
C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing and supports for concrete reinforcement.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of Codes, Specifications and Standards listed in Article 1.3 of this Section, except where more stringent requirements are shown or specified.
B. Quality Control: Owner will employ a testing and inspection agency to perform inspections as scheduled on Structural Drawings - General Notes.

1.6 DELIVERY, STORAGE & HANDLING

A. Reinforcing steel shall be free of rust, scale, or other coating at time of delivery and placing.
B. Deliver bars separated by size and tagged with manufacturer’s heat or test identification number.
C. Properly protect reinforcing bars on site after delivery.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

A. Reinforcing Bars: Grades as shown on Structural Drawings.

B. Welded Wire Fabric: Welded steel wire fabric, sizes as shown on Structural Drawings.

C. Steel Wire: ASTM A82, plain, cold-drawn steel.

D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

1. For slabs-on-grade, use concrete brick supports.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

PART 3 - EXECUTION

3.1 PLACING REINFORCEMENT

A. Comply with CRSI “Manual of Standard Practice” for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by form work, construction or concrete placement operations. Locate and support reinforcing by chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into Work, anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Cast-in-place concrete Work in accordance with the Contract Documents.
- B. Quality of concrete used on Project but furnished under other Sections.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 - SUBMITTAL PROCEDURES: for submittal procedures.
- C. Section 01 45 21 - TESTING LABORATORY SERVICES: for testing.
- D. Section 01 45 10 - MOISTURE & ALKALINITY TESTING OF CONCRETE SLABS: for testing.
- E. Section 03 11 00 – CAST-IN-PLACE CONCRETE FORMWORK: for formwork.
- F. Section 03 21 00 – REINFORCING STEEL: for reinforcing steel.
- G. Section 03 35 10 – CONCRETE FLOOR SLAB PREPARATION: for preparation of concrete slabs scheduled to received floor coverings..
- H. Section 03 54 16 - CEMENTICIOUS TOPPING: for material for repair of larger areas.
- I. Section 07 26 00 - VAPOR RETARDERS: for under-slab vapor retarder and above-slab moisture-retaining cover.
- J. Section 31 20 00 - EARTHWORK: for capillary break under slab-on-grade.
- K. STRUCTURAL DRAWINGS, General Notes: for additional requirements.

1.3 REFERENCES
- A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
- B. American Concrete Institute (ACI):
  1. ACI 301, Specifications for Structural Concrete.
  2. ACI 302.1R, Guide for Concrete Floor and Slab Construction.
  3. ACI 305R, Hot Weather Concreting.
  4. ACI 306.1, Cold Weather Concreting.
  5. ACI 318, Building Code Requirements for Reinforced Concrete.
  6. ACI Document SP-66, Detailing Manual.
- C. ASTM International (ASTM):
  1. ASTM C94/C94M, Standard Specification for Ready-Mix Concrete.
  2. ASTM E1155, Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
- D. International Code Council, Inc. (ICC):
  1. International Building Code (IBC) as amended by State in which Project is located, Chapter 19.

1.4 QUALITY ASSURANCE
- A. Codes and Standards: Comply with provisions of the referenced Codes, Specifications and Standards, except where more stringent requirements are shown or specified.
- B. Quality Control: The Owner will employ a testing laboratory to perform detailed tests as specified in Part 3 of this Section.
- C. Pre-Installation Conference:
  1. At least 30 days prior to start of the concrete construction schedule, conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete construction, including architectural concrete finish and floor slabs.
  2. Require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
     - a. Contractor’s superintendent.
     - b. Testing agency responsible for field quality control.
     - c. Concrete subcontractor, if applicable.
     - d. Cement finishing subcontractor, if applicable.

e. Ready-mix concrete producer.
f. Admixture manufacturer(s).
g. Concrete pumping contractor.
h. Contracting Officer.
i. Structural Engineer-of-Record.
j. Curing and sealing agent manufacturer's technical representative.

3. Conference agenda shall include, but not limited to, the following:
a. Embeds.
b. Water cement ratios.
c. Quality control measures.
d. Finish.
e. Shoring.
f. Surveying, pre-pour and post-pour.
g. Curing.

4. Minutes of the meeting shall be recorded, typed, printed and distributed to all parties within five (5) calendar days of the meeting. One copy of the minutes shall also be transmitted to Architect.

D. Moisture Vapor Emissions & Alkalinity Testing:
1. Measure moisture vapor emissions and alkalinity of below-grade, on-grade and above-grade concrete slabs to receive floor finish in accordance with the requirements of Section 01 45 10.
2. Acceptable test results: As specified in Section 01 45 10.

1.5 SUBMITTALS
A. Submit in accordance with the provisions of Section 01 33 00.
B. Design Mixes:
1. For each concrete mix, include alternate mix designs when characteristics of materials, Project conditions, weather, test results or other circumstances warrant adjustments.
2. Mix designs shall meet the requirements of ACI 318 and include at least 30 test results for each mix submitted.
a. If complete test data is not available, the submitted mix design shall be supplemented with the required data to substantiate the submitted design.
b. Data shall conform to the requirements of ACI 318 and include the average, mean, and standard deviation of the test results.

C. Product Data: For each type of product indicated.
D. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.
E. Delivery Tickets: require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job site for use of Contracting Officer or his representatives. Tickets shall show the following:
1. Name of ready-mix batch plant.
2. Serial number.
3. Date and truck number.
4. Contractor name.
5. Project name and location.
6. Specific class or designation of concrete in conformance with that employed in Project Specification.
7. Volume of concrete.
8. Time loaded.
9. Type, name, and volume of admixture used.
10. Volume and type of cement.
11. Total water content.
12. Volume of water added by receiver of concrete with his initials.

F. Laboratory test reports

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or II. Use one brand of cement throughout project, unless otherwise acceptable to Architect.

B. Fly-Ash: ASTM C618, Type C or Type F.

C. Normal Weight Aggregates: ASTM C33, and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

D. Water: Drinkable.

E. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with Project requirements, provide one of the following:
   a. AEA-92 and Air Mix 200 by The Euclid Chemical Co., www.euclidchemical.com.
   b. Sika Aer by Sika Corp., www.sikaconstruction.com.
   c. MB-VR or MB-AE by Master Builders.

F. Water-Reducing Admixture: ASTM C494, Type A, and containing not more than 0.1 percent chloride ions.

1. Products: Subject to compliance with Project requirements, provide one of the following:
   a. Eucon WR-75 or Eucon WR-91 by The Euclid Chemical Co., www.euclidchemical.com.
   b. Pozzolith Normal or Polyheed by Master Builders, Inc.
   c. Plastocrete 160 by Sika Corp., www.sikaconstruction.com.

G. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G and containing not more than 0.05 percent chloride ions.

1. Products: Subject to compliance with Project requirements, provide one of the following:
   a. Eucon 37 by The Euclid Chemical Co., www.euclidchemical.com.
   b. Sikament 300 by Sika Corp., www.sikaconstruction.com.
   c. Rheobuild 1000 by BASF, www.basf-admixtures.com.

H. Non-Chloride, Non-Corrosive Accelerating Admixture: Accelguard 80 by The Euclid Chemical Co., www.euclidchemical.com.

I. Water-Reducing, Retarding Admixture: ASTM C494, Type D, and containing not more than 0.05 percent chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Eucon Retarder 75 by The Euclid Chemical Co., www.euclidchemical.com.
   b. Pozzolith Retarder by BASF, www.basf-admixtures.com.

2.2 RELATED MATERIALS

A. Concrete Curing Agent: Coordinate use of curing agent with requirements of finish floor covering manufacturers.

1. Exterior walks and floor slabs to be left exposed: Ashford Formula by Curecrete Chemical Company, Inc., www.ashfordformula.com. No substitutions.
2. Floor slabs to receive finish flooring: If required, vapor emission reducer(s) shall be capable to reducing vapor emissions to within acceptable Project limits and be accepted in writing by floor covering manufacturer(s).
3. Formed surfaces: ASTM C309, Type 1, Class B.

B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application on fresh concrete.

C. Bonding Compound: Polyvinyl acetate type.

1. Weldcrete by Larson Products Corp., www.larsonproducts.com.

2. Euco Weld by The Euclid Chemical Co., www.euclidchemical.com.
3. Approved equal.

D. Dowel Bar Epoxy Grout: See General Notes on Structural Drawings.

E. Underlayment Compound: as specified in Section 03 35 10.

F. Fiber Reinforcement: Fibermesh as manufactured by Propex Operating Co., LLC, www.fibermesh.com.

G. Waterstops:
1. Split Ribbed Kwik-Tie RSB9-12 by Vinylflex Corp., www.vinylflex.com.
2. Approved Substitution.

H. Expansion Joint Filler Strips: ASTM D1752, Type II.
1. Where required to support expansion joints, sealant joints and joints indicated as "preformed joint filler," use Type 1 gray sponge rubber filler strips.

I. Semi-Rigid Epoxy Floor Joint Sealant: Two component, self-leveling pourable sealant with Shore A hardness of 70 to 90.
1. Products: Subject to compliance with Project requirements, provide one of the following:
a. Sikadur 51SL by Sika Corp., www.usa.sika.com.
b. Euco 700 by Euclid Chemical Co., www.euclidchemical.com.
c. Approved Substitution.

2.3 PROPORTIONING & DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
1. Use of fly ash shall not exceed 25 percent of cement content by weight.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 calendar days prior to start of Work.
1. Do not begin concrete production until mix design Submittal is returned by Architect with appropriate action allowing Contractor to proceed.

C. Adjustment to Concrete Mixes: Adjustments to Mix design may be requested by Contractor under provisions of Section 00 90 00, Contractor's Request for Design Deviation, when characteristics of materials, job conditions, weather, test results or other circumstances warrant, at no additional cost to Owner, and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

D. Concrete Fill: Mix concrete fill for steel pan-type stairs and platforms in proportions, by weight, of one part Portland cement, 1-1/2 parts sand and 3 parts coarse aggregate. Grade coarse aggregate from 1/8 inch with at least 95 percent passing a 3/8 inch sieve and not more than 10 percent passing a No. 8 sieve. Mix in one pound of fiber reinforcement per cubic yard of concrete at the time concrete is batched.

E. Admixtures: The word "PROVIDE" as used below indicates mandatory. The word "USE" as used below indicates Contractor's options.
1. Provide Type A water-reducing admixture or Type F high-range water-reducing admixture (super plasticizer) in slab on grade concrete.
2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.
3. Use high-range, water-reducing admixture in pumped concrete, concrete for slabs, architectural concrete, concrete required to be watertight and concrete with water / cement ratios below 0.50.
4. Use air-entraining admixture in exterior exposed concrete, to provide 5 percent ± 1-1/2 percent entrained air by volume.
5. Use Type A or Type A / F water reducing admixture for all exterior slabs, paving and walks except as otherwise specified.

6. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
7. Slump limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
   a. Ramps, slabs and sloping surfaces: Not more than 3 inches.
   b. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
   c. Concrete containing HRWR admixture (super plasticizer): Not more than 8 inches after addition of HRWR to verified 2 inch to 3 inch slump concrete.
   d. Other concrete: Not less than 1 inch nor more than 4 inches, unless specifically authorized by Architect or Structural Engineer.

2.4 CONCRETE MIXING

A. Batch Tickets: Provide tickets for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity and amount of water introduced.
B. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.
   1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
   2. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that damaged sections of under-slab vapor retarder have been properly repaired in accordance with Section 07 26 00.
B. Formwork, reinforcing steel, inserts, bolts, boxes, templates, pipes, conduits, and other accessories shall be installed by appropriate Section and inspected prior to pouring.
C. Moisten wood forms immediately before placing concrete where form coatings are not used.
D. Remove water and debris from space to be poured.
E. The following shall be reported to Architect as part of the construction record for all elevated floors and roofs:
   1. Following installation and hardening of concrete, provide survey data values in the same format for the top of concrete at each column and mid-bay. Include a statement indicating whether or not concrete meets construction tolerances.

3.2 JOINTS IN SLABS

A. Construction Joints: Locate and install construction joints so as not to impair strength and appearance of the structure.
   1. Expansion joints: Joints that interrupt concrete pour, discontinue reinforcement, but provide interlock to prevent differential vertical settlement.
   2. Contraction (control) joints: Joints installed to control cracking or pour joints where reinforcement is continuous.
B. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
C. Construct isolation joints in slabs on grade at points of contact between slab on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.
D. Construct contraction (control) joints in slabs on grade as shown. Use saw cuts to a depth-of-slab thickness/4 inches deep, unless otherwise indicated.
   1. Slab-on-grade: Form contraction joints in floor slabs by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate. Seal sawed joints with semi-rigid epoxy floor joint sealant.

3.3 CONCRETE PLACEMENT

A. Pre-Placement Inspection: Before placing concrete, inspect and complete form work installation, reinforcing steel and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. General:

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
2. Apply temporary protective covering to lower 2 feet of finished walls adjacent to floor slab pours and similar conditions, and guard against spattering during placement.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

D. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, redding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

E. Do not use vibrators to transport concrete inside forms.

1. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine.
2. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer.
3. Do not insert vibrators into lower layers of concrete that have begun to set.
4. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

F. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing within a panel or section is complete.

G. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

H. Bring slab surfaces to correct level with straightedge and strike-off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

I. Maintain reinforcing in proper position during concrete placement operations.

3.4 COLD WEATHER PLACEMENT

A. Protect concrete Work form physical damage or reduced strength which could be caused by frost, freezing actions or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F, and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Do not use calcium chloride, salt or other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

3.5 HOT WEATHER PLACEMENT

A. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement.
2. Mixing water may be chilled, or chopped ice may be used to control temperature, provided equivalent water volume of ice is calculated into total amount of mixing water.
3. Liquid nitrogen may be used to cool concrete at Contractor's option.
4. Cover reinforcing steel with water-soaked burlap if reinforcing becomes too hot, so that steel temperature will not exceed ambient air temperature immediately before embedment in concrete.
3. Fog spray forms, reinforcing steel and subgrade just before placing concrete.
4. Use water-reducing retarding admixture when required by high temperature, low humidity or other adverse placing conditions.
5. Use special curing methods as specified herein.

3.6 FINISH OF FORMED SURFACES

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish Work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Grout-Cleaned Finish: This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch tie holes and defective areas, with fins or projections completely removed and smoothed. Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours. Provide this finish for exterior exposed formed surfaces.

C. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process. For sides of curbs and housekeeping pads.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING FLOORS & SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic tile or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E1155, for a randomly trafficked floor surface. On elevated slabs, floor flatness shall be measured after corrections (grinding and/or fill) are made, just prior to installation of floor coverings.

Schedule 1.5 - Tolerances for Levelness and Flatness				
Scheduled Floor Finish	Random Traffic Floors			
	Overall Value		Minimum Local Value	
	F_F (Flatness)	F_L (Levelness)	F_F (Flatness)	F_L (Levelness)
Carpet	25	20	17	15
Resilient Flooring	35	25	24	17
Ceramic Tile	35	25	24	17
Slab-On-Grade	35	25	24	17

1. Flatness / Levelness Tolerances for Imaging Equipment: Refer to Vendor Installation Coordination Drawings for tolerance requirements at time of equipment installation for spaces having medical imaging equipment.
2. Levelness Tolerance for ICC / CCU Doors: Shall not exceed 1/4-inch across opening from jamb-to-jamb at time of door installation, including path of travel for breakaway panels.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic tile is to be installed. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete walks, steps and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application. Provide edge tooling as indicated.

3.8 CONCRETE PROTECTING & CURING

A. General: Curing method(s) shall be compatible with scheduled finish floor covering(s).

B. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry or windy conditions cause moisture loss approaching 0.2 pounds per square foot x height before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding and bull floating or darbying concrete, but before float finishing.

D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings and other surfaces.

F. Curing Methods for Unformed Surfaces: Perform curing of concrete by vapor emission reducer, curing and sealing compound, by moisture-retaining cover curing and as herein specified. Start curing as soon as free water is disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 72 hours. Avoid rapid drying at end of curing period.
1. Moisture-cover curing: Use this method for slabs to receive ceramic tile or concrete stain. Cover concrete surfaces with geotextile felt for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches

and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

2. Vapor emission reducer: Apply to floor slabs to receive finish flooring or roofing in strict accordance with manufacturer's instructions.
3. Curing and sealing compound: Apply to floor slabs to be left exposed and exterior walks and paving. Install in strict accordance with manufacturer's instructions.

G. Protection: Do not allow any foot traffic on freshly poured floors for at least 24 hours. Delay other traffic on floors as long as possible.

3.9 MISCELLANEOUS CONCRETE ITEMS

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

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

C. Housekeeping Pads: Provide equipment bases, as shown on drawings. Set anchor bolts for equipment to template at correct elevations, complying with certified diagrams templates of manufacturer furnishing machines and equipment.

D. Expansion Joint Fillers: Set flush with surface or recess from surface as indicated, leaving minimum exposure at completion. Install to full depth and widths of joints.

3.10 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect. Cut out honeycombs, rock pockets and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

B. For exposed-to-view unpainted surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

D. Repair of Slab Surfaces: Test slab surfaces, as specified in Article 3.11 – Quality Control testing During Construction of this Section for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas in shored slabs and slabs on grade as herein specified. Test surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

1. Repair finished slab surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets and other objectionable conditions.
2. Correct high areas in surfaces by grinding, after concrete has cured at least 14 calendar days.
3. Correct low areas in surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete.

Finish repaired areas to blend into adjacent concrete. Self leveling underlayment may be used when acceptable to Architect.

3.11 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Special inspection, sampling, and testing for quality control during placement of concrete will be performed by the Testing and Inspection Agency and shall include the following, as directed by Architect.

B. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.

1. Slump: ASTM C143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
2. Air content: ASTM C231 pressure method; one for each day's pour of each type of air entrained concrete.
3. Concrete temperature: Test hourly when air temperature is 40 deg F and below, and when 80 deg F and above; and each time a set of compression test specimens made.
4. Compression test specimen: ASTM C31; one set of 4 standard cylinders for each compressive strength test. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required. One specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
5. Frequency of compression strength tests: ACI 318 Section 5.6.

C. Strength Requirements and Compliance:

1. Test results shall be reported in writing to Structural Engineer-of-Record, Architect, concrete manufacturer and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength and type of break for both 7 and 28 day tests.
2. Acceptance of tests: ACI 318 Section 5.6.
3. Non-destructive testing: Impact hammer, sonoscope or other non-destructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

D. Enforcement:

1. When actual non-compliance and / or ominous trends are observed by the Testing and Inspection Agency, such information will be relayed to Contractor and concrete supplier and confirmed promptly in writing. Such warning shall be heeded by concrete supplier who shall take immediate appropriate action to correct deficiency.
2. If non-compliance occurs, producer will be warned to take immediate corrective action. Test results of concrete furnished subsequent to such a warning shall comply. Test results indicating noncompliance after one warning will be sufficient cause for Architect to refuse to permit additional concrete to be furnished by the non-complying producer.
3. Additional tests: The Testing and Inspection Agency will make additional tests of in-place concrete as directed by Structural Engineer-of-Record or Building Official in accordance with ACI 318 Section 5.6, when test results indicate specified concrete strengths and other characteristics have not been attained in the structure. Testing and Inspection Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for tests conducted, and additional testing as may be required, when unacceptable concrete is verified.
4. The testing and inspection agency shall reject concrete with water added in excess of the allowance listed on the batch ticket.
5. Corrective Work:

a. If results of additional testing show that the actual strength of the concrete is sufficiently low as to jeopardize performance of the structure, the Structural Engineer may require that the unacceptable concrete be removed from the structure and be replaced at no additional cost to the Owner.
b. If floor flatness and levelness do not meet specified criteria, provide surface repairs to bring floor slab to compliance and retest.

END OF SECTION

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SECTION 03 35 10 CONCRETE FLOOR SLAB PREPARATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparation of concrete floor slabs scheduled to receive floor coverings, including:
   1. Drying concrete slab to required relative humidity and moisture vapor transmission rate (MVTR).
   2. Correcting slabs that are rough or out-of-tolerance.
   3. Correcting slabs that exceed required relative humidity and vapor emission rates.

B. Work of this Section is affected by Vendor Installation Coordination Drawings for slab flatness and levelness requirements for certain medical equipment.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.

B. Section 01 33 00 – SUBMITTAL PROCEDURES: for submittal of product data.

C. Section 01 33 12 – COORDINATED SUBMITTAL REQUIREMENTS: for simultaneous submittal of related Submittals from different Specification Sections.

D. Section 01 45 10 – MOISTURE & ALKALINITY TESTING IN CONCRETE SLABS: for testing.

E. Section 03 54 00 – CAST UNDERLAYMENT: for cementitious patching and leveling underlayments.

F. Division 09 – FINISHES: for floor coverings to be installed over prepared concrete substrate.

G. VENDOR DRAWINGS: for additional requirements for levelness and flatness.

1.3 REFERENCES

A. Reference Standards shall be latest published edition at issue date of Contract Documents.

B. American Concrete Institute (ACI):
   1. ACI 117, Specifications for Tolerances for Concrete Construction and Materials and Commentary.

C. ASTM International (ASTM):
   1. ASTM C1059, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
   2. ASTM F710, Standard Practice for preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
   3. ASTM E1155, Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

1.4 QUALITY ASSURANCE

A. Employ technicians trained and experienced using the specialized equipment for measuring concrete floor flatness and floor levelness.

B. Slab Levelness & Flatness: Meet requirements of medical equipment Vendor. See Vendor Drawings for requirements.

1.5 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Test Data: Submit test data for all testing.

C. Letter Acknowledging Substrates Meet Warranty Requirements: Prior to commencing installation of flooring, submit letters signed by primary floor coating or covering product manufacturer and installer for each flooring product. This Project includes several different flooring products. Letters are required for each type of product. Letters shall include the following:
   1. A statement that applicable concrete substrates have been examined in the field and that all defects have been repaired satisfactorily to meet requirements for specified warranties.
   2. Specified test data has been reviewed and meets requirements for specified warranties.

3. Concrete substrates meet all warranty requirements by primary flooring product manufacturer and installer.

D. Product Data: If tests indicate that vapor emission retarder is required, submit product data for proposed vapor emission retarder(s) for Architect's review.

E. If vapor emission retarder is required, submit letter by each floor coating or covering manufacturer that proposed vapor emission retarder product(s) is approved for use under their respective floor coating or covering products scheduled for use on this Project.
1. Approval letter(s) shall be dated after date that moisture vapor emission tests were conducted.

1.6 PROJECT / SITE CONDITIONS

A. Roofing system must be installed and all exterior openings closed in.

B. Areas shall be heated and dry.

C. Acceptable concrete substrate shall meet the following tolerances:
1. Flatness / Levelness Tolerances for Medical Equipment: Refer to Vendor Installation Coordination Drawings for tolerance requirements at time of equipment installation for spaces having medical equipment.
2. Levelness Tolerance for ICU Entrances: Levelness shall not exceed 1/4-inch across opening from jamb-to-jamb at time of entrance installation, including path of travel for breakaway panels.

PART 2 - PRODUCTS

2.1 DRYING EQUIPMENT

A. Provide fans, heaters, dehumidifiers, etc. required to dry out concrete floor slabs to required level.
1. Heating equipment is limited to electric heaters or indirect-fired units for gas, oil or kerosene with exhaust piped directly to building exterior.
2. Direct-fired gas, oil or kerosene heaters are not allowed.

2.2. CEMENTITIOUS UNDERLAYMENTS

A. As specified in Section 03 54 00.

2.3 VAPOR EMISSION RETARDER

A. The need for a vapor emission retarder shall be determined by Contractor based on the following:
1. Contractor's Construction Progress Schedule.
2. Contractor's ability to manage installation and protection of under-slab vapor retarder at concrete slabs-on-grade.
3. Concrete is sufficiently dry, in-situ relative humidity and MVTRs meet requirements of the Contract Documents.

B. If required, selection of vapor emission retarder product(s) shall be based on results of required testing and limitations / requirements of specific products by vapor emission retarder manufacturer.

C. Select vapor emission retarder product approved in writing by floor coating and floor covering manufacturers for use under their products scheduled for this Project.

2.4 ACCESSORY MATERIALS

A. Bonding Agent: ASTM C1059, Type II, non-re-dispersible, acrylic emulsion or styrene butadiene.

PART 3 - EXECUTION

3.1 COORDINATION

A. Contractor shall review, coordinate and accommodate Work of other trades that interface with, affect or are affected by Work of this Section to ensure efficient execution of the overall Work.

B. Coordinate placement of new concrete, floor coating or covering, curing and dying requirements with Section 03 33 00.

3.2 DRYING CONCRETE SLAB

A. General: Manage and control variables affecting dry-out of concrete slabs as required to maintain Contractor's Construction Progress Schedule.

B. Drying Concrete Slabs:

1. Concrete slab shall be fully cured and reached design strength.
2. Dry out new or existing concrete slabs-on-grade and elevated concrete slabs using fans, heaters, and dehumidifiers until moisture content, in-situ relative humidity and moisture vapor emission rate meet requirements of the Contract Documents.
    a. Where liquid curing compound has been used to cure concrete floor slabs, remove any remaining compound from substrate using mechanical means to allow complete drying out of concrete slab.

3.3 TESTING

A. Moisture and Alkalinity Testing: After slab dry-out operations are complete, perform tests of all below-grade, on-grade and elevated concrete slabs scheduled to receive floor coatings or coverings under the provisions of Section 01 45 10.

1. Measure moisture vapor emissions and alkalinity of below-grade, on-grade and above-grade concrete slabs to receive floor finish in accordance with the requirements of Section 01 45 10.

3.4 PREPARATION

A. Inspect concrete slab floor surfaces to determine that they are satisfactory.

B. A satisfactory concrete subfloor is defined as one that is smooth, within specified tolerances for flatness, within floor coating or covering manufacturer's maximum acceptable moisture content and within moisture vapor emission limits and free from cracks, holes, ridges, old adhesives, maintenance coatings preventing adhesive bond and other defects impairing performance, appearance or floor covering manufacturer's warranty.

C. Verify that required floor-mounted utilities are in correct location and installed to proper height to receive flooring material flush with top surface.

D. General: Prepare concrete floors in accordance with ASTM F710 and the following:

1. Out-of-Tolerance Floor Slabs: Repair areas of slab that do not meet surface tolerances specified in Paragraph 1.4B of this Section. Grind and fill with cementitious underlayment until specified tolerance is achieved. Prepare substrate and install cementitious underlayment in strict conformance with manufacturer's written instructions.
2. Rough or Uneven Floor Slabs: Remove roughness, ridges and bumps. Fill minor low spots, cracks, joints, holes and other defects with cementitious underlayment to achieve smooth, flat, hard surface suitable for floor covering installation.
    a. Prohibit traffic until underlayment is cured.
3. Contaminated Concrete (oil, grease, wax, asphalt, etc.): Remove all contaminated concrete by mechanical methods, such as shotblasting, grinding, scabbing, jackhammer, etc., and patch affected area with cementitious underlayment or new concrete slab as necessary for specific conditions.
    a. Do not use solvents or removers.
    b. Patching concrete slabs exposed to view which are scheduled to receive clear finish coating is not acceptable. Remove these slabs to closest control or construction joints and re-pour concrete.
4. Random Cracks and Single Holes 1-Inch Diameter and Less: Route cracks over 1/16-inch and cut holes to sound concrete. Clean off dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at

least 72 hours.

5. Floor Slab Alkalinity: Where alkalinity test results do not meet requirements of the Contract Documents, corrective action is required.
   a. Corrective measures include washing and/or priming to bring pH level of concrete slab within acceptable limits.
   b. Prior to commencing corrective Work, obtain written approval of proposed corrective measure from applicable floor coating or covering manufacturer.
6. Floor Slab Moisture: Where in-situ relative humidity and/or MVTR test results do not meet requirements of the Contract Documents, corrective action is required. Corrective measures include removal of non-compliant concrete by mechanical methods and pouring new concrete or installing vapor emission retarder as specified under Article 3.5 of this Section.

E. Vacuum clean concrete substrate.

3.5 INSTALLATION – VAPOR EMISSION RETARDER

A. If Contractor determines the need for installing a vapor emission retarder, either to maintain Project Construction Progress Schedule, or as alternative to replacement of a concrete slab that has excessive moisture, conform to the following:
   1. Obtain floor coating or covering manufacturer's written approval of vapor emission retarder product(s) selected for use.
   2. Select vapor retarder product that will reduce relative humidity and MVTR of concrete floor slab to level required by floor coating or covering manufacturer.
   3. Prepare concrete and install vapor emission retarder in strict conformance with vapor emission retarder manufacturer's installation instructions and as required to achieve specified warranty.
      a. Include any inspections by manufacturer's technical field representative or other special requirements required to achieve specified warranty.

END OF SECTION

SUBSTRATE ACCEPTANCE for FLOORING INSTALLATION & PRODUCT WARRANTIES

1. Project Name: _____

2. Project Location: _____

3. Building Data:

Floor Level 1:	
Date of last concrete pour for this floor level: (obtain date from Contracting Officer)	

4. Installer and Authorized Field Representative for Flooring Manufacturer Data:

	Installer	Flooring Products Manufacturer
Company		
Name		
Position		
Phone		
eMail		
Address		

5. Concrete Cure & Seal was applied to this floor. ☐ yes, ☐ no ☐ unknown

   If yes or unknown, cure & seal has been mechanically removed. ☐ yes, ☐ no

6. In-situ relative humidity, vapor emission and alkalinity test data reports for this floor level have been received from the General Contractor and all results are within acceptable limits for valid Warranty.

7. Vapor emission retarder was applied to this floor. ☐ yes, ☐ no

   If yes, retarder was applied by ☐ General Contractor ☐ Flooring Installer

   Product Data: Name of Manufacturer: _____

   Name of Product: _____

8. Prepared concrete substrates have been verified by field observation and test data to meet all installer and primary flooring manufacturer requirements for valid Warranty and are otherwise ready and acceptable to begin installation of the floor coating and covering materials.

_____ _____
Installer Date

_____ _____
Authorized Field Representative for Flooring Manufacturer Date

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SECTION 03 54 00 CAST UNDERLAYMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cementitious self-leveling underlayments for applications from not less than 1/8-inch to 1-1/2 inches in single pour.

B. Cementitious trowelable underlayment patch for applications from 1-inch thick maximum to feathered edges for smoothing and local repairs of concrete substrates prior to installation of floor covering.

C. Cementitious finishing underlayments that provide a smooth, permanent finish applied to concrete substrates prior to installation of floor covering.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.

B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.

C. Section 01 33 12 – COORDINATED SUBMITTAL REQUIREMENTS: for simultaneous submittal of related Submittals from different Specification Sections.

D. Section 03 35 10 – CONCRETE FLOOR SLAB PREPARATION: for prepared concrete substrate to receive cast underlayment.

1.3 REFERENCES

A. Reference Standards shall be latest published edition at issue date of Contract Documents.

B. ASTM International (ASTM):

1. ASTM C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-In. or Cube Specimens).

1.4 QUALITY ASSURANCE

A. Installation of the cement-based, self-drying, self-leveling topping shall be by a manufacturer-trained applicator who has specific experience with installation of specified topping using mixing equipment and tools approved by manufacturer.

B. Manufacturer’s Technical Representative shall meet with General Contractor prior to slab pours and review flatness and levelness criteria and surface finish.

C. Topping material shall achieve compressive strength of 6,100 pounds per square inch after 28 days per ASTM C109 / modified (air-cure only).

D. Topping shall be walkable after 2 to 3 hours (70 deg F) and be able to be coated with a water-borne coating as soon as the surface can be worked on without damage.

1.5 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Submit manufacturer’s Product Data and installation instructions for cementitious underlayments, including test data as may be required to show compliance with the Contract Documents.

C. Substrate Acceptance for Flooring Installation & Product Warranty Form: Submit under the provisions and Section 01 33 00 and Section 01 33 12 as prerequisite to installation work, a copy of the executed Form. Blank form is available at end of Section 03 35 10.

1.6 DELIVERY, STORAGE & HANDLING

A. Deliver materials in their unopened packages and protect from extreme temperatures and moisture.

1.7 PROJECT CONDITIONS

A. Delay the installation as long as possible, but coordinate curing time with application of sealer.

B. If temporary screeds are used for controlling levelness, remove them in a timely way so that patching will not be evident in cured surface.

C. Limit extent of pours to coincide with control joints in base slabs.

D. Provide specified edging where topping is not terminated against walls.
E. Topping is a cementitious material. Observe the basic rules of concrete Work.
   1. Do not install below 50 deg F surface temperature.
   2. Install quickly if floor is warm and follow hot weather precautions available from manufacturer's technical service department.
   3. Never mix with cement or additives other than pigment and water.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT
A. Cementitious Toppings: Self-leveling cementitious underlayment, 4100 psi compressive strength, able to be installed from not less than 1/8-inch to 1-1/2 inches in single pour and may be tapered to match existing elevations. Applied thickness up to 5 inches with appropriate aggregate.
B. Subject to compliance with Project requirements, provide products by one of the following:
   1. K 15 Premium Self-Leveling Underlayment by Ardex Engineered Cements, www.ardex.com.
   2. No Substitutions.
C. Subject to compliance with Project requirements, provide primer products by one of the following:
   1. Primer: Ardex P-51 primer.
   2. No Substitutions.

2.2 CEMENTICIOUS TROWELABLE UNDERLAYMENT PATCH
A. Trowel grade cementitious base compound for applications from 1-inch thick maximum to feathered edges, 4200 psi compressive strength. Applied thickness up to 3 inches with appropriate aggregate. Material specified below is intended for smoothing and local repairs of concrete substrates prior to installation of floor covering. For larger areas, material specified under Article 2.1 of this Section may be used.
   1. SD-P InstatPatch by Ardex Engineered Cements, www.ardex.com.
   2. No Substitutions.

2.1 CEMENTICIOUS FINISHING UNDERLAYMENT
A. Portland cement-based finishing underlayment that provides a smooth, permanent finish applied to concrete substrates prior to installation of floor covering; capable of feather edge; mold and mildew resistant.
B. Subject to compliance with Project requirements, provide products by one of the following:
   1. SD-F Feather Finish by Ardex Engineered Cements, www.ardex.com.
   2. No Substitutions.

PART 3 - EXECUTION

3.1 PREPARATION
A. All substrates shall be sound, solid, cleaned and primed:
   1. Ensure that all concrete subfloors are clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bondbreaker before priming.
   2. Mechanically clean if necessary using shot blasting or other approved method.
   3. Acid etching and the use of sweeping compounds and solvents are not allowed.
   4. Repair all cracks in substrates to minimize telegraphing through topping.
   5. Inspect substrates and correct for moisture or any other conditions that could affect performance of cast underlayments.
B. Joint Preparation:
   1. Control Joints: Form or dry grind control joints through the cast underlayment. Wet sawing is not allowed.
   2. Non-moving Joints: Fill all non-moving joints with underlayment or patching compound as required and recommended by manufacturer.

C. Priming: Prime all substrates with manufacturer's recommended requirements, unless manufacturer's technical representative issues a determination in writing that priming can be minimized or deleted.

3.2 MIXING

A. Follow manufacturer's printed installation instructions.

3.3 APPLICATION OF CEMENTITIOUS UNDERLAYMENTS

A. Follow manufacturer's printed installation instructions.
B. Trowel, pour or pump, as appropriate for specific product, the liquid underlayment material and spread in place following manufacturer's installation instructions.
C. Use manufacturer's smoother to release trapped air.
D. Wear baseball or soccer shoes with non-metallic cleats to avoid leaving marks in the liquid.
E. Make surface repairs to remove visual defects as recommended by manufacturer.

END OF SECTION

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SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural dimension lumber framing.
B. Non-structural dimension lumber framing.
C. Rough opening framing for doors, windows, and roof openings.
D. Sheathing.
E. Underlayment.
F. Preservative treated wood materials.
G. Fire-retardant-treated wood materials.
H. Miscellaneous framing and sheathing.
I. Communications and electrical room mounting boards.
J. Concealed wood blocking, nailers, and supports.
K. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal of product data, Shop Drawings and samples.
C. Section 05 12 00 – STRUCTURAL STEEL: for structural steel framing support of wood framing.
D. Section 05 50 00 – METAL FABRICATIONS: for miscellaneous steel shapes and connectors and support angles for wood framing.
E. Section 06 17 33 – WOOD I-JOISTS: for wood i-joists to be installed in Work of this Section.
F. Section 06 18 13 – GLUE-LAMINATED CONSTRUCTION: for glue-laminated construction to be installed in Work of this Section.
G. Section 09 21 00 – GYPSUM BOARD ASSEMBLIES: for gypsum board products to be applied to Work of this Section.
H. STRUCTURAL DRAWINGS, GENERAL NOTES: for additional requirements.

1.3 REFERENCES

A. American National Standard Institute (ANSI):
   1. ASNI A208.1, American National Standard for Particleboard.
B. American Forest and Paper Association (AFPA):
   1. AFPA T10, Wood Frame Construction Manual.
C. ASTM International (ASTM):
   1. ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   2. ASTM C27, Standard Specification for Fireclay and High-Alumina Refractory Brick.
   3. ASTM D2559, Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
   4. ASTM D2898, Standard Test Methods for Accelerating Weathering of Fire-Retardant-Treated Wood for Fire Testing.
   5. ASTM D3201, Standard Test Method for Hydroscopic Properties of Fire-Retardant Wood and Wood-Based Products.
   6. ASTM D6841, Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber.
   7. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
D. American Wood-Preservers' Association (AWPA):
   1. AWPA C2, Lumber, Timber, Bridge Ties and Mine Ties – Preservative Treatment by Pressure Processes.
   2. AWPA U1, Use Category System – User Specification for Treated Wood.
E. National Institute of Standards and Technology, Product Standards (PS):

1. NIST PS1, Structural Plywood.
2. NIST PS20, American Softwood Lumber Standard.

F. International Code Council (ICC):
1. International Building Code (IBC).

1.4 QUALITY ASSURANCE

A. Lumber grading and wood species: Voluntary Product Standard PS20: Grading rules of the following organizations to apply: Uniform Building Code (UBC) and UBC Standards.
B. Evidence of grade: Each piece of lumber and sheet material to be stamped with grademark and trademark of the association having jurisdiction, or accompanied by official certificate of inspection.
C. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Owner satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E699, that it has experience and capacity to satisfactorily conduct testing indicated without delaying the Work.
D. Wood treatment: All treated lumber to be furnished with grade stamp affixed or accompanied by mill certificate of inspection bureau. American Wood Preservers Bureau (AWPB) or approved.
E. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by a single producer.

1.6 INFORMATION SUBMITTALS

A. Submit under provisions of Section 01 33 00.
B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.5 DELIVERY, STORAGE & HANDLING

A. Protect all material delivered to Site from damage and weather until used.
B. Store materials off ground, under cover to assure proper drainage, ventilation and weather protection.
C. Do not deliver materials to Site until approximate time of use.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Unless otherwise specified, each piece of lumber shall bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
B. Dimension Lumber: Comply with PS20 and requirements of specified grading agencies.
1. If no species is specified, provide any species graded by the agency specified; if not grading agency is specified, provide lumber graded by any grading agency meeting specified requirements.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www. alsc.org) and who provides grading service for species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
C. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on Drawings, S4S.
B. Moisture Content: S-dry or MC19.
C. Stud Framing (2 by 2 through 2 by 6):
1. Species: Douglas Fir.
2. Grade: No. 2.
D. Joist, Rafter, and Small Beam Framing (2x6 through 4 x 16):
1. Machine stress-rated (MSR) as follows:

a. Fb-single (minimum extreme fiber stress in bending): 900 psi.
b. E (minimum modulus of elasticity): 1,300,000 psi.

2. Species: Douglas Fir.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.3 STRUCTURAL COMPOSITE LUMBER

A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.

B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on Drawings; structural capacity as published by manufacturer.

2.4 STRUCTURAL USE PANELS

A. Comply with APA.

B. Bear mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by end use, span rating, and exposure durability classification.

C. Wall & Roof Sheathing:
1. APA rated sheathing panels, durability classification Exposure 1 or Exterior; span rating of 16/0 or greater for supports at 16 inch centers and 24/0 or greater for supports at 24 inch centers.
2. Thickness: As indicated on Structural Drawings.

D. Subflooring Under Resilient Floor or Carpet: Exposure 1, with APA rating, span rating and thickness as indicated on Structural Drawings.

E. Underlayment: APA rated Exposure 1, not less than 1/4-inch thick over subfloor.

F. Laminated Veneer Lumber (LVL):
1. Bonded jointed wood veneers with ASTM D2559 adhesive.
2. Scarf jointed wood veneers with grain of wood parallel.
3. Sizes: As indicated on Structural Drawings.

2.5 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Board: PS1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Other Applications, not specified elsewhere:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS1, A-D, or better.
3. Other Locations: PS1, C-D Plugged or better.

2.6 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel per ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

C.

2.5 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 – Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lb/cu ft retention.
   1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   2. Treat lumber in contact with roofing, flashing, or waterproofing.
   3. Treat lumber in contact with masonry or concrete.
   4. Treat lumber less than 18 inches above ground.

2.6 FACTORY FIRE-RETARDANT-TREATED WOOD MATERIALS

A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of ASTM E84 for lumber and ASTM C27 for plywood. Identify fire-retardant-treated wood with appropriate classification marking or UL; SGS U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to Authorities Having Jurisdiction.
   1. Provide fire-retardant-treated wood in all concealed areas of construction, as shown or indicated on Drawings, and as required by Code.
   2. Fire-Retardant-Treated Plywood by Pressure Process: Products with a Flame Spread Index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond centerline of burners at any time during test.
      a. Use treatment that does not promote corrosion of metal fasteners.
   3. Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to Authorities Having Jurisdiction and for which a current model Code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.
   4. For exposed Work indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions of use:
   1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer or chemical formulation under evaluated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency. Design value adjustment factors shall be calculated according to ASTM D6841.
   2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
   3. Contact with treated wood does not promote corrosion of metal fasteners.
   4. Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Exterior Type: Use for exterior locations and where indicated. Comply with ASTM D2898.

D. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively.

E. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL

A. Select material sized to minimize waste.

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

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

3.2 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

F. Frame wall opening with two or more studs at each jamb; support headers on cripple studs.

G. Installation of Wood Framing:
   1. Install joists and rafters at not more than 24 inches on center and at spacing indicated on Drawings.
   2. Install studs at not more than 16 inches on center and at spacing indicated on Drawings.
   3. Install single bottom plates and double top plates, except where indicated otherwise.
   4. Single top plates may be installed at interior non-load-bearing walls.
   5. Overlap double top plates at corners, intersections, and ends.
   6. Triple studs at corners and wall intersections.
   7. Install framing with 1/4 inch maximum deviation from indicated alignment.
   8. Install preservative treated framing at locations indicated on Drawings.

H. Installation of Headers Over Wall Openings: [Unless noted otherwise]
   1. Install double studs and double headers at framed openings less than 4 feet wide.
   2. Install triple studs and double headers at framed opening 4 feet and greater wide.
   3. Set headers on edge and support ends on jamb studs.
   4. Maximum Header Spans:
      a. Two 2 x 4: Spans to 3 feet 6 inches.
      b. Two 2 x 6: Spans to 4 feet 6 inches.
      c. Two 2 x 8: Spans to 6 feet.
      d. Two 2 x 10, Braced: Spans to 8 feet 9 inches.

3.3 BLOCKING, NAILERS, & SUPPORTS

A. Install 2 inch nominal thick blocking as indicated and as required to support toilet accessories, wall hung cabinets, toilet compartments, and plumbing, fire protection, mechanical, and electrical equipment.

B. Install blocking for wall mounted door stops on wood framed walls.

C. Install solid blocking between joists and rafters at bearing walls and beams.

D. Install blocking between studs at wood-framed walls and partitions at floor and ceiling lines.

E. Install smoke stop blocking at double stud wood-framed walls and partitions at maximum horizontal intervals of 10 feet.

F. Install smoke stop blocking at combustible blind spaces exceeding 10 feet in any dimension to create a barrier to the passage of flame at 10 feet maximum intervals.

G. Install 2 inch nominal thick by width of stud blocking at mid-height of single story walls over 8 feet high and at mid-height of multistory walls.

H. Anchor wood blocking to substrates to support applied loads.

3.4 NAILING & BOLTING

A. Minimum nailing in accordance with IBC Table 2304.9.1.
B. Install washers under nuts and under bolt heads bearing on wood.
C. Install fasteners for plates to foundation using anchor bolts at not more than 48 inches on center or powder driven fasteners at not more than 32 inches on center.
D. Soap threads of lag bolts prior to installing.
E. Drill lag bolt holes 9/16 inch diameter for 3/4 inch bolts and 1/2 inch diameter for 5/8 inch bolts.
F. Furnish bolts with threads not bearing on wood.
G. Enlarge lag bolt holes to shank diameter for length of unthreaded shank.
H. Do not drive lag screws, wood screws, and lag bolts.
I. Pre-drill nail holes and screw holes when required to prevent wood splitting.

3.5 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
    1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
    2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
    3. Install adjacent boards without gaps.

3.6 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
B. Allow preservative to dry prior to erecting members.

3.7 TOLERANCES

A. Framing Members: 1/4inch from true position, maximum.
B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.8 ADJUSTING & CLEANING

A. Remove split and warped framing prior to installation of sheathing and gypsum panels.
B. Adjust framing to comply with location and deflection requirements of National Design Specifications.
C. Remove excess wood, sawdust, and loose fasteners from Site.

END OF SECTION

SECTION 06 10 53 MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Miscellaneous rough carpentry.
- B. Concealed wood blocking and nailers.
- C. Wood backing.
- D. Plywood backing panels for equipment.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 – SUBMITTAL PROCEDURES: for submittal procedures.
- C. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING: for framing to receive concealed wood backing.

1.3 REFERENCES
- A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
- B. ASTM International (ASTM):
  1. ASTM A153/A153M, Standard Specification for Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.
  2. ASTM C1002, Standard Specification for Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Lath Plaster Bases to Wood Studs or Steel Studs.
  3. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. American Wood Preservers' Association (AWPA):
  1. AWPA C9, Plywood – Preservative Treatment by Pressure Processes.
  2. AWPA C20, Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
  3. AWPA C27, Plywood - Fire-Retardant Treatment by Pressure Processes.
  4. AWPA PS1, U.S. Product Standard for Construction and Industrial Plywood.
  5. AWPA U1, Use Category System: User Specifications for Treated Wood.

1.4 QUALITY ASSURANCE
- A. Reference Standards: Except as modified by governing Codes and requirements of this Section, comply with applicable provisions of the reference Standards listed under Article 1.3 of this Section.

1.5 PROJECT CONDITIONS
- A. Coordination: Fit carpentry Work to other Work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other Work.
- B. Contractor's Option: Fire retardant wood blocking may be provided in lieu of metal backing in gypsum board partitions. See Section 09 22 16.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS
- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
- B. If no species is specified, provide lumber graded by any grading agency meeting specified Project requirements.
- C. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.2 DIMENSION LUMBER

A. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring: “Standard or better” grade lumber, S4S, unless otherwise indicated.

2.3 PLYWOOD BACKING PANELS FOR EQUIPMENT

A. Telephone and Electrical Equipment Backing Panels: PS 1 A-D plywood, 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.4 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Mark each piece of wood with producer's stamp indicating compliance with specified requirements. Marks shall be by testing and inspection agency acceptable to authorities having jurisdiction.

C. Fire-Retardant Treated Wood:

1. Interior Type A: AWPA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   b. All interior rough carpentry items are to be fire retardant treated.
   c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

D. Preservative Pressure Treatment of Plywood Above Grade: AWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft (4.0 kg/cu m) retention.
   a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
   b. Treat plywood in contact with masonry or concrete.
   c. Treat plywood in other locations as indicated.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type, material as indicated and/or required for application.

B. Provide G60 hot dip galvanized bolts and expansion type anchors for attachment of chromated copper arsenate (CCA-C) preservative pressure-treated wood to concrete or masonry.

C. Provide G185 hot dip galvanized (ZMAX™) or stainless steel bolts and expansion type anchors for attachment of other than CCA-C preservative pressure-treated wood to concrete or masonry.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Securely attach carpentry Work to substrate by anchoring and fastening as shown and as required to recognized Standards.

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

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Includes but is not limited to the following:
   1. Wood paneling.
   2. Nurses stations and reception desks.
   3. Standing and running trim.
   4. Chair rails.
   5. Handrails.
   6. Wall base.
   7. Display casework.
   8. Slatwall.
   9. Pegboard.
   10. Fire-rated wood door frame.
   11. Miscellaneous items where shown.

B. Work of this Section is affected by Alternates.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: for submittal procedures.
C. Section 05 50 00 - METAL FABRICATIONS: for concealed countertop support brackets.
D. Section 06 61 16 - SOLID SURFACING FABRICATIONS: for solid surfacing to be applied to work of this Section.
E. Section 08 80 00 - GLAZING: for glass doors and shelving to be installed in Work of this Section.
F. Division 09 – FINISHES, INTERIOR FINISH SPECIFICATION: for selected species, cut, and grain patterns.
G. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: for concealed backing.
H. Section 10 11 16 - MARKERBOARDS: Markerboard skins to be installed in Work of this Section.
I. Section 12 32 16 - PLASTIC LAMINATE-CLAD CASEWORK: for hardware.

1.3 REFERENCES

A. Reference Standards shall be latest published edition at issue date of Contract Documents.
B. Architectural Woodwork Institute (AWI):
   1. Architectural Woodwork Quality Standards.
C. National Fire Protection Agency (NFPA):
   1. NFPA 80, Standard for Fire Doors and Other Opening Protectives.
   2. NFPA 252, Standard Methods of Fire Tests for Door Assemblies.
D. Underwriters Laboratories, Inc. (UL):
   1. UL 723, Test for Surface Burning Characteristics of Building Materials.

1.4 REGULATORY REQUIREMENTS

C. All wood products shall meet the applicable Class requirements per ASTM E84 or UL 723 in accordance with IBC table 803.9 provided below.

IBC Table 803.9 INTERIOR WALL & CEILING FINISH REQUIREMENTS BY OCCUPANCY			
Group	Sprinklered		
	Exit enclosures & exit passageways	Corridors	Rooms and enclosed spaces
A-2, A-3, B	B	C	C
I-2	B	B	B

1.5 QUALITY ASSURANCE

A. Reference Standards: Architectural Woodwork Quality Standards by AWI. AWI references herein apply to this Standard.
B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
   1. Test pressure: Test at positive pressure per UL IOC for all S-labeled doors.
   2. Oversize fire-rated door assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
   3. Temperature-rise rating: If indicated, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

1.6 ACTION SUBMITTALS
A. Submit under the provisions of Section 01 33 00.
B. Provide copies of all Submittals to Contracting Officer.
C. Hardwood Samples: 8-1/2 x 11 inches. Submit the following samples in duplicate for approval:
   1. Wood panel/veneer with specified finish, 8-1/2 x 11 inches.
   2. Hardwood with specified finish: 1 x 6 x 11 inches.
D. Shop Drawings: Submit large scale plans, elevations and details of all assembled architectural woodwork. Include rough-in provisions of Work of other trades where applicable. Include all necessary finishing information including product data, with Shop Drawing Submittal.
E. Product Data: Provide hardware catalog cuts on all hardware Substitutions for approval.

1.7 PRODUCT HANDLING
A. Protect woodwork during transit, delivery, storage and handling to prevent wetting, damage, soiling and deterioration.
B. Do not deliver woodwork, until painting, wet work, sanding and grinding, and similar operations which could have detrimental effects on woodwork, have been completed in installation areas.

1.8 PROJECT CONDITIONS
A. Environmental Conditions, General: Establish and maintain the optimum indoor relative humidity between 20 and 60 percent in spaces where Work is to be installed.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
A. General: Except as otherwise indicated, all wood products shall comply with ~~following~~ requirements of Article 2.1 of this Section for architectural woodwork not specifically indicated as prefabricated or prefinished standardized products.
B. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content of not less than 6 percent and not more than 10 percent.
   1. Fire retardant lumber: As specified in Section 06 10 53. Provide as backing for running trim.
   2. Preservative treated lumber: As specified in Section 06 10 53. Provide for plates in contact with concrete.
C. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to actual sizes as required by AWI 100 or to actual sizes and patterns as shown, unless otherwise indicated.

2.2 INTERIOR WOOD FOR TRANSPARENT FINISH

A. Except as Otherwise Indicated:
   1. Solid wood: As scheduled in Division 09, Interior Finish Specification, AWI Grade I per 100-T-4 and 100-T-5.
   2. Veneer: As scheduled in Division 09, Interior Finish Specification, AWI Grade A per 200-T-9.

2.3 BOARD MATERIALS

A. Particle board: 45 pcf density, Industrial Grade.
B. Panel backing: MDF particle board.
C. Flame-retardant panel backing: Class 1 Flame-retardant MDF particle board when tested per UL 723.
   1. Approved Manufacturer: Vesta-FR MDF by Flakeboard, www.flakeboard.com.
D. Plywood for Concealed Use: Softwood plywood, any face species, veneer core, PS-1 Grade A-B, glue type as recommended for application.

2.4 WOOD PANELING

A. Approved Manufacturers: Subject to requirements, provide products by one of the following:
   1. Basis of Design: Teragren, www.teragren.com.
   2. Eggers Industries, www.eggersindustries.com.
B. Flush Paneling: Plywood with Bamboo face veneer for transparent finish, no added urea-formaldehyde. For panel dimensions and selected veneers see Section 09 06 10.
C. To avoid staining of finished veneers, panel adhesive products shall contain no chemicals that react with borate.

2.5 SLATWALL

A. Approved Manufacturers: Subject to requirements, Contractor's choice.
B. Panels: 1-inch thick fire retardant-treated plywood.
C. Finish: High-pressure laminate, NEMA LD3, Grade GP50. Provide forming grade where required. Backing sheets: Phenolic, 0.020 inch thick. Colors as scheduled in Section 09 06 10.
D. Slatwall Inserts: Aluminum Tee, painted finish, custom color as selected by Architect.
E. Accessories: Shelving, brackets, hooks, and all other accessories are not in Contract.

2.6 STANDING & RUNNING TRIM

A. Solid hardwood for transparent finish. See Section 09 06 10 for selected species and grains.
B. Profiles as indicated on Drawings

2.7 CHAIR RAILS & HANDRAILS

A. Solid hardwood for transparent finish. See Section 09 06 10 for selected species and grains.
B. Profiles as indicated on Drawings

2.8 FIRE-RATED WOOD DOOR FRAME

A. Approved Manufacturers: Subject to requirements, provide products by one of the following:
   1. Eggers Industries, www.eggersindustries.com.
B. Fire-Rating: 90 minutes, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.9 PEGBOARD

A. Approved Manufacturers: Subject to requirements, provide products by one of the following:
   1. Wall Control Storage Systems, www.wallcontrol.com.

2. Approved Substitutions.

B. Fabricated from 20 gauge steel, prefinished. Color: As selected from manufacturer's standard colors. Panels shall accept standard pegboard accessories. Include mounting hardware.

C. Accessories: Hooks, pegs, brackets, and shelves not in Contract.

2.10 HARDWARE

A. Provide casework hardware as specified in Section 12 32 16, unless otherwise noted.

2.11 FABRICATION, GENERAL

A. Quality Standards: Comply with design and construction features for architectural woodwork as shown. Where not shown, provide architectural woodwork in accordance with the following AWI Standards as applicable:
1. Standing and running trim: Section 300, custom grade.
2. Casework and countertops: Section 400, flush overlay design, custom grade.
3. Paneling: Section 500, custom grade.
4. Finishing: Section 1500.

B. Fabricate standing and running trim to dimensions, profiles and details shown. Rout or groove reverse side (backed-out) of trim members to be applied to flat surface, except for members with ends exposed in finish Work.

C. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain measurements and verify dimensions and Shop Drawing details as required for accurate fit.

D. Wood Panels: Fabricate with 1/2-inch MDF backing. Paint butt edges flat black.

E. Molded Work: Cope at returns and internal angles and miter at external corners.

2.12 SHOP-APPLIED FINISHES

A. Finish all shop-fabricated natural woodwork under this Section with custom grade conversion varnish, satin finish. Fill open grade wood subject to hand contact. Stain wood to match factory-finished doors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install concealed backing attached to metal studs for running trim.

B. Prior to installation verify that environmental conditions are met.

3.2 INSTALLATION

A. General: Comply with AWI Section 1700, custom grade except as otherwise indicated.

B. Coordinate Work with that of other trades affected by this installation. Unless otherwise shown, provide supports and attachments to be incorporated into or added to Work.

C. Provide a competent and experienced superintendent to supervise, coordinate and expedite the installation.

D. Scribe and cut Work to fit adjoining Work and refinish cut surfaces or repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built-in or directly attached to substrates.

F. Install paneling to walls with construction or panel adhesive. Provide 1/16 inch joints between panels and between panels and adjoining materials.

G. Install standing and running trim with minimum number of joints possible, using full length pieces to the greatest extent possible. Hand select pieces of wood for natural finish to minimize variation of grain between adjacent pieces. Provide 45 degree hairline joints. Attach wood trim with adhesive and electric nails. Touch-up all nail holes with matching color putty.

H. Install fire-rated door frames in strict accordance with NFPA 80.

I. Install Work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8-inch in 8 feet for plumb and level.

J. Repair any damaged woodwork or finish prior to Substantial Completion. Eliminate all functional and visual defects.

END OF SECTION

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SECTION 06 60 00 PLASTIC FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Provide resin panels in vertical applications in accordance with the Contract Documents for installation under other Sections.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 – SUBMITTAL PROCEDURES: for submittal procedures.
C. Section 01 78 23 – OPERATION & MAINTENANCE DATA: for maintenance data to be included in Operation & Maintenance Manuals.
D. Section 06 40 00 – ARCHITECTURAL WOODWORK: for architectural woodwork substrates to receive Work of this Section.
E. Division 09 – FINISHES, INTERIOR FINISH SPECIFICATION: for selected patterns and colors.
F. Section 09 53 23 – METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES: for resin panels to be supported independently at or above acoustical ceiling suspension assemblies.
G. Section 12 32 16 – PLASTIC LAMINATE-CLAD CASEWORK: for casework to receive Work of this Section.

1.3 REFERENCES

A. Reference Standards shall be latest published edition at issue date of Contract Documents.
B. ASTM International (ASTM):
   1. ASTM D635, Standard Test Method for rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
   2. ASTM D1929, Standard Test Method for Determining Ignition Temperature of Plastics.
   3. ASTM D2843, Standard Test Method for Density of Smoke from the Burning of Decomposition of Plastics.
   4. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
C. International Code Council (ICC):
   1. International Building Code (IBC) as amended by State in which Project is located.
D. National Fire Protection Association (NFPA):
   1. NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
E. Underwriters Laboratories (UL):
   1. UL 723, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 REGULATORY REQUIREMENTS

A. Resin panels shall meet requirements of IBC 803.1.2 and NFPA 286.

B. All resin panel products exposed to view shall meet the applicable requirements per ASTM E84 or UL 723 in accordance with IBC Table 803.9 provided below.

IBC Table 803.9 INTERIOR WALL & CEILING FINISH REQUIREMENTS BY OCCUPANCY			
Occupancy Group	Sprinklered		
	Exit enclosures & exit passageways	Corridors	Rooms and enclosed spaces
A3	B	B	C
B	B	C	C
I-2	B	B	B

1. Surface Burning Characteristics when tested in accordance with ASTM E84:
   a. Class A: Flame Spread index of 0-25 and Smoke Developed index of 450 or less.
   b. Class B: Flame Spread index of 26-75 and Smoke Developed index of 450 or less.
   c. Class C: Flame Spread index of 76-200 and Smoke Developed index of 450 or less.

C. Self-Ignition Temperature: Pass with a temperature of not greater than 650 deg F when tested in accordance with ASTM D1929.

D, Fire-test-response characteristics must be substantiated with original test results for manufacturer's products. Test results for generic products are not acceptable.

1.5 ACTION SUBMITTALS

A. Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Closeout Submittals: Submit under the provisions of Section 01 78 23 maintenance data for each installed product.

1.7 PROJECT / SITE CONDITIONS

A. Do not install Work of this Section until walls and ceilings of the spaces to receive the Work have been finished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to Project requirements, provide resin panels by one of the following:
   1. 3form, www.3-form.com.
   2. Lumicor, www.lumicor.com.
   3. No Substitutions.

2.2 RESIN PANELS

A. Decorative Panels: Dynamic interlayer system, acrylic or PETG with embedding fabrics, metals, natural foliage, wood veneers, and assorted additional core elements.
B. Patterns and Colors: As scheduled in Section 09 06 10.
C. Thickness: As indicated on Drawings.

2.3 ACCESSORIES

A. Stand Offs: Provide by same manufacturer as resin panels. Manufacturer's standard.
   1. Size: As indicated on Drawings.
B. Glazing U-Channels: Extruded 6063-T52 aluminum shapes, clear anodized.
   1. Subject to requirements, provide glazing channels by one of the following:
      a. C.R. Laurence Co. Inc., www.crlaurence.com.

b. Julius Blum & Company, Inc., www.juliusblum.com.
c. Approved Substitution.
2. Size: As indicated on Drawings.

C. Setting Blocks: Appropriate for application.
D. Glazing Gaskets: Manufacturer's standard for application.

2.4 FABRICATION

A. Shop fabricate components to greatest extent possible to sizes and shapes indicated on approved Shop Drawings.
B. Provide shop cutouts for fittings and accessories as indicated on approved Shop Drawings.
C. Cut and finish component edges with clean, sharp returns.
1. Rout radii and contours to template.
2. Repair or replace defective and inaccurate panels.
D. Fabrication Tolerances: Plus or minus 1/16-inch overall.

PART 3 - EXECUTION

3.1 CLEANING & PROTECTION

A. After installation, clean exposed surfaces to remove dirt, adhesive, sealant, and other blemishes in accordance with resin panel manufacturer's written instructions.
B. After cleaning, apply heavy kraft paper or other protective coating masked in place to protect surface damage until date of Substantial Completion.

END OF SECTION

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SECTION 07 21 00 THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide thermal insulation in accordance with the Contract Documents.
   1. Thickness and insulation types are shown on Drawings.
   2. The scope and application of insulation is specified herein.

B. Vapor retarder.

C. Air / water barrier for exterior walls.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.

B. Section 01 33 00 - SUBMITTAL PROCEDURES: Product data.

C. Section 07 84 13 - PENETRATION FIRESTOPPING: Safing insulation at slab perimeters.

D. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: Partition sound attenuation blankets.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.

B. ASTM International (ASTM):
   1. ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   2. ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
   3. ASTM C665, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
   4. ASTM C666 / C666M, Standard Test Method for Resistance of Concrete Rapid Freezing and Thawing.
   5. ASTM D1621, Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
   6. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 QUALITY ASSURANCE

A. Comply with the requirements of ASTM C665 as applicable, unless otherwise shown or specified.

B. Insulation products shall be free from formaldehydes, PCBs and other known cancer causing agents.

1.5 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Manufacturer's Data: Submit manufacturer's literature, specifications and installation instructions for each type of insulation, tape, mechanical fastener and adhesive. Include certifications and laboratory test reports as may be required to show compliance with the Contract Documents.

1.6 PRODUCT HANDLING

A. Deliver insulation materials in manufacturer's unopened containers or packages, fully identified with trade name, type, class and other classifying information. Store above grade and protect from weather and damage from any source.

B. Plastic Insulation: Protect plastic insulation from overlong exposure to sunlight and keep away from sources of heat. Do not deliver plastic insulation to Project Site before Work is ready to accept it.

PART 2 - PRODUCTS

2.1 UNFACED MINERAL FIBER BLANKET / BATTS

A. Thermal insulation produced by combining glass mineral fibers with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane facing).

B. Widths: 16 inches to match stud spacing.

2.2 EXTRUDED POLYSTYRENE BOARDS, STANDARD DENSITY

A. Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C578; with 5-year aged k-values of 5.4 and 5 at 40 and 75 deg F, respectively.

B. Minimum compressive strength: 15 pounds per square inch when tested in accordance with ASTM D1621.

C. Size: 1.5 inches thick in manufacturer's standard sizes.

D. R-Value: R-5 per inch of material. Overall value R-7.5.

E. Panel Edges: Ship lap or tongue and groove.

2.3 EXTRUDED POLYSTYRENE BOARDS, HIGH DENSITY

A. Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C578; with 5 year aged k-values of 5.4 and 5 at 40 and 75 deg F, respectively.

B. Minimum compressive strength: 40 pounds per square inch when tested in accordance with ASTM D1621.

C. Size: Manufacturer's standard sizes.

D. R-Value: R-5 per inch of material.

2.4 MINERAL SAFING BATTS

A. ASTM C612, non-combustible, lightweight, semi-rigid batt insulation. Non-combustible when tested in accordance with ASTM E136, Flame Spread 0 and Smoke Developed 0 when tested in accordance with ASTM E84.

1. Acceptable Manufacturer: Roxul Safe by Roxul Inc., www.Roxul.com
2. Thickness: 2 inches.

2.5 AUXILLARY MATERIALS

D. Auxiliary Insulating Materials:

1. Mechanical Fasteners: Zinc-coated steel or nylon fasteners consisting of an adhesively-applied perforated plate and prongs or spindles and self-locking washers.
   "Stic-Klip Type N" by Eckel Industries of Canada Ltd.
   Gemco, Spindle Type.

2.4 VAPOR RETARDER

E. Vapor Retarder: Scrim-reinforced polyethylene or foil laminated to scrim-reinforced Kraft paper; laboratory-tested vapor transmission rating of 0.03 perms. Flame spread: 25 maximum.

1. Application: On inside of insulated metal stud framing and over semi-rigid insulation at perimeter of building.
2. Tape: 3M "Contractor Sheathing Tape" No. 8086 or equivalent, as recommended by manufacturer of insulation to be taped; flame spread 0 to 25.

F. Air / Water Barrier: Tyvek commercial wrap in 5 foot rolls.

1. Application: On the exterior side of all gypsum sheathing.
2. Tape: Tyvek Dupont contractor tape.
3. Fasteners: Self-drilling flat head steel screws with mild shanks and hardened tips and organic polymer coating. Install with galvanized washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

B. Apply semi-rigid unfaced insulation to concrete surfaces with mechanical fasteners as recommended by the manufacturer. Where zee furring is indicated, friction fit between zees. Cut pins 1/8 inch beyond face of board and apply self-locking cap after applying vapor retarder.

1. Install fasteners at corners of boards, allowing 3 to 6 inches edge distances for boards exceeding 48 inches in length; apply additional fastener in the middle.

C. Install batt insulation by friction fitting between studs.

3.2 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder over all interior side of insulated exterior walls from lowest insulated walls to underside of roof decking. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those which have been stuffed with loose fiber-type insulation. Extend vapor retarder behind exterior columns to maintain continuity.

B. Seal overlapping joints in vapor retarders with adhesives or tape per vapor retarder manufacturer's printed directions. Seal butt joints and fastener penetrations with tape. Locate all joints over framing members or other solid substrates. Firmly attach vapor retarders to framing with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

C. Seal joints caused by pipes, conduits, structural braces, electrical boxes and similar items penetrating vapor retarders with tape to create an air-tight seal between penetrating objects and vapor retarder.

D. Repair any tears or punctures in vapor retarders immediately before concealment by other Work. Cover with tape or another layer of vapor retarder.

3.3 INSTALLATION OF AIR / WATER BARRIER

A. Install air / water barrier immediately ahead of exterior finish.

B. Install barrier from bottom up, horizontally, lapping upturned flashing 4 inches. Secure top edge of roll with continuous tape. Lap vertical and horizontal edges 6 inches. Tape all penetrations.

C. Install screws into metal studs as required to prevent blow-off until exterior finish is installed.

3.4 SCHEDULE OF THERMAL INSUATION PRODUCTS

SCHEDULE 3.4 - THERMAL INSULATION PRODUCTS		
Tag	Type	Where Required
INS-1	Unfaced Mineral Fiber Blanket/Batt	Stud cavities of exterior walls.
INS-2	Extruded Polystyrene Boards, Standard Density	Cavity space of exterior walls, mechanically attached through glas-mat gypsum sheathing to wall studs.
INS-3	Extruded Polystyrene Boards, High Density	Under concrete slab-on-grade at building perimeter. Interior side of below-grade concrete stem walls.
INS-4	Mineral Safing Batt	Perimeter gaps between concrete floor slab and exterior wall system.
INS-5	Spray Foam	Stud cavities of exterior walls, where indicated.
[---]	Board Roof Insulation as specified in Section 07 52 00.	
[---]	Sound Attenuation Batts as specified in Section 09 21 16.	

END OF SECTION

SECTION 07 21 02 REPAIR OF EXISTING THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. For remodel projects, repair damaged thermal insulation and vapor retarder.

1.2 RELATED SECTIONS
A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 02 41 19 - SELECTIVE DEMOLITION: Removal and disposal of damaged thermal insulation and vapor retarder.

1.3 QUALITY ASSURANCE
A. Match existing materials.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Match existing materials.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Remove damaged thermal wall insulation under the provisions of Section 02 41 19 and replace.
B. Seal overlapping joints in existing vapor retarders with adhesives or tape per vapor retarder manufacturer's printed directions.
   1. Seal butt joints and fastener penetrations with tape.
   2. Locate all joints over framing members or other solid substrates.
   3. Firmly attach vapor retarders to framing with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.
C. Seal joints caused by pipes, conduits, structural braces, electrical boxes and similar items penetrating vapor retarders with tape to create an air-tight seal between penetrating objects and vapor retarder.
D. Repair any tears or punctures in vapor retarders immediately before concealment by other Work.
   1. Cover with tape or another layer of vapor retarder.

END OF SECTION

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SECTION 07 26 00 VAPOR RETARDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Under-slab vapor retarder at slab-on-grade.
B. Above-slab moisture-retaining covers for curing concrete to receive ceramic tile or concrete stain.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
C. Section 01 60 00 - PRODUCT REQUIREMENTS: Submit Manufacturer / Product Selection Notification Form.
D. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete Curing: for above-slab moisture-retaining covers used to cure concrete slabs to receive ceramic tile or concrete stain.
E. Section 31 20 00 - EARTHWORK: Capillary break under slab-on-grade.

1.2 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. American Concrete Institute (ACI):
   1. ACI 302.1R, Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.
C. ASTM International (ASTM):
   1. ASTM C171, Standard Specification for Sheet Material for Curing Concrete.
   2. ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials.
   3. ASTM E154, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
   4. ASTM E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
   5. ASTM E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.3 ACTION SUBMITTALS

A. Submit under provisions of Section 01 33 00.
B. Submit Manufacturer / Product Selection Notification Form.
C. Manufacturer's installation instructions for placement, seaming and pipe boot installation.

PART 2 - PRODUCTS

2.1 UNDER-SLAB VAPOR RETARDER

A. Extremely low permeance vapor retarders for critically sensitive, low permeance floor coverings. Includes floor coverings of rubber, vinyl, urethane, epoxy and methyl methacrylate, linoleum and wood.
B. Approved Products and Manufacturers:
   1. Stego Wrap 15-Mil by STEGO INDUSTRIES LLC, www.stegoindustries.com.
   2. Moistop Ultra "A" by FortifiberCorp., www.fortifiber.com
   3. Vaporblock 15 by Raven Industries, Engineered Films Div., www.vaporblock.com.

2.2 ACCESSORIES FOR UNDER-SLAB VAPOR RETARDER

A. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.
B. Pipe Boots: Construct pipe boots from vapor retarder material and pressure sensitive tape per manufacturer's printed instructions.

2.3 ABOVE-SLAB MOISTURE-RETAINING COVER

A. One of the following, complying with ASTM C171-03:
   1. Waterproof paper.
   2. Polyethylene film.
   3. Polyethylene-coated burlap.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect.
   1. Level and tamp or roll aggregate base capillary break.

3.2 INSTALLATION

A. Under-Slab Vapor Retarder:
   1. Install in accordance with manufacturer's printed instructions and ASTM E1643–98.
   2. Unroll vapor retarder with long dimension parallel with direction of the pour.
   3. Lap vapor retarder over footings and seal to foundation walls.
   4. Overlap joints 6 inches and seal with manufacturer's tape and return up perimeter foundation walls not less than 4 inches.
   5. Seal all penetrations (including pipes) with manufacturer's pipe boot.
   6. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
   7. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and sealing all four sides with tape.

B. Above-Slab Moisture-Retaining Cover:
   1. Install over exposed concrete of elevated concrete slabs only to maintain moisture control during curing period.

3.3 ADJUSTMENT

A. Repair damaged sections of under-slab vapor retarder with same material and seal with seam tape as required.

END OF SECTION

SECTION 07 26 11 MOISTURE CORRECTION SYSTEMS FOR FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Moisture correction of concrete floor slabs for floor coverings.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 – SUBMITTAL PROCEDURES: for submittal of product data.
- C. Section 01 33 12 – COORDINATED SUBMITTAL REQUIREMENTS: for simultaneous submittal of related Submittals from different Specification Sections.
- D. Section 01 45 10 – MOISTURE & ALKALINITY TESTING IN CONCRETE SLABS: for testing.
- E. Section 03 54 00 – CAST UNDERLAYMENT: for cementitious patching and leveling underlayments.
- F. Section 01 77 00 – CLOSEOUT PROCEDURES: for closeout Submittals.
- G. Section 01 78 23 – OPERATION & MAINTENANCE DATA: for submission of operation & maintenance data.
- H. Division 09 – FINISHES: for specified floor coverings.
- I. INTERIOR FINISH DRAWINGS: for locations of scheduled floor coverings.

1.3 REFERENCES
- A. Reference Standards shall be latest published edition at issue date of Contract Documents.
- B. ASTM International (ASTM):
  1. ASTM C1583, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension.
  2. ASTM D1308, Chemical Resistance of Finishes.
  3. ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials.
  4. ASTM F710, Standard Practice for Preparing Concrete Floor to Receive Resilient Flooring.
  5. ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
  6. ASTM F2170, Standard Test Method for Determining Relative Humidity In Concrete Floor Slabs Using In-Situ Probes.
- B. International Concrete Repair Institute (ICRI):
  1. ICRI No. 0310.2, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.4 DEFINITIONS
- A. Moisture Vapor Emission Rate (MVER): Rate of moisture vapor emission expressed in pounds per 1000 square feet per 24 hours.

1.5 QUALITY ASSURANCE
- A. Certify that products meet or exceed Project requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum five years experience.
- C. Applicator Qualifications: Company specializing in performing work of this Section with not less than five years experienced and approved by manufacturer.
- D. Field Supervisor Qualifications: Trained by product manufacturer, under direct full-time supervision of manufacturer's own foreman.
- E. Source Limitations: Provide all materials of the system including, but not limited to: primers, resins, hardening agents and finish or sealing coats, from a single manufacturer.

1.6 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of for each material and product used.

C. Existing Conditions Report: Prior to installation of moisture correction system, submit written report by system representative of existing moisture vapor emission rates and alkalinity of concrete substrates.

D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1. Include information on mixing and application.
2. Indicate type of floor drains required, details at floor drains, special procedures, and perimeter conditions requiring special attention.

E. Submit letter by each floor coating or covering manufacturer that moisture corrective system product(s) are approved for use under their respective floor coating or covering products scheduled for use on this Project.

1. Approval letter(s) shall be dated after date that moisture vapor emission tests were conducted.

1.7 INFORMATIONAL SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Certificate of specified requirements.

C. Qualification Statements: From Manufacturer(s), Applicators, and Field Supervisor.

D. Concrete Testing Standard: Submit a copy of ASTM F710.

E. Copy of completed system manufacturer's pre-installation checklist together with copy of written approval to proceed received from system manufacturer.

1.8 CLOSEOUT SUBMITTALS

A. Submit under the provisions of Sections 01 77 00 and 01 78 23.

B. Manufacturer's Material Safety Data Sheets.

1.9 FIELD CONDITIONS

A. Do not install system until floor penetrations and peripheral work are complete.

B. Maintain minimum ambient temperatures of 50 deg F for 72 hours before, during and 24 hours after installation of underlayment.

C. During curing process, ventilate spaces to remove excess moisture.

1.10 DELIVERY, STORAGE & HANDLING

A. Deliver materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, batch number, shelf life and directions for storing and mixing with other components.

B. Store all materials under cover and elevated above grade.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 70 deg F.

1.10 WARRANTY

A. Manufacturer shall furnish written warranty with a $1,000,000 insurance binder adding Owner as additional loss payee.

B. A trained applicator shall apply the product, or a technician must be on Site during applications for verification to receive 10-year warranty on all floor finishes.

C. When a floor finish system is installed on below-grade, on-grade, or above-grade concrete slab treated with the product according to manufacturer's instruction, manufacturer shall warrant floor covering system against delamination due to negative-side moisture migration or moisture-born contaminates for a period of ten (10) years from the date of original installation. Warranty shall cover both labor and materials necessary to repair or replace floor finish if repairs cannot be made.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Selection of vapor emission reducer product(s) shall be based on moisture emission rate test results and vapor emission reducer manufacturer's requirements and limitations of their products.

B. Vapor Emission Reducer: Select a vapor emission reducer product acceptable to, patching compound, underlayment, floor coating and floor covering manufacturers for use under their products specified for this Project.

C. Acceptable products capable of reducing moisture vapor emissions from rate listed to 3 pounds per 1000 square feet per 24 hours or less.

1. **System 1,** For Emission Rates Up To 12 Pounds: Ardex MC by Ardex Engineered Cements. www.ardex.com.
2. **System 2,** For Emission Rates 20 to 25 Pounds: Vaportight Coat –SG3 by Aquafin, Inc. www.aquafin.net.
3. **System 3,** For Emission Rates Up To 27 Pounds: MoistureBloc by Vexcon Chemicals, www.vexcon.com.

2.2 DESCRIPTION

A. Flooring Moisture Corrective System shall reduce vapor emissions of concrete substrate to less than 3 lbs and the underlayment or topping surface shall be suitable to receive all types of floor coverings or sealers.

1. Floors scheduled to receive no additional finish or a finish that has no moisture or alkalinity requirements are not required to comply with the Work of this Section.

2.3 MATERIALS

A. System Main Component: Epoxy based materials. Materials vary with manufacturer.

B. Crack Filler: Product approved for use by manufacturer.

C. Water: Potable and sufficiently cool so as not to speed up mix setting.

D. Manufacturer's certification that the system has been tested in accordance with ASTM D1653 and has a rating of not more than 0.05.

2.4 MIXING

A. Site mix materials in accordance with manufacturer's written instructions.

B. Mix to self-leveling consistency without over-watering.

PART 3 - EXECUTION

3.2 PREPARATION

A. Before proceeding, refer to ASTM F710. All concrete substrates shall be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before application and mechanically prepared to minimum ICRI concrete surface profile of CSP #3, light shotblast.

1. Mechanically clean using shot blasting or other method to achieve specified profile.
2. Acid etching and use of sweeping compounds and solvents are not acceptable means of preparing concrete.

B. All concrete substrates must be of adequate tensile strength, not less than 200 psi when tested in accordance with ASTM D4541 Method 5.

D. Test concrete substrates for moisture vapor emissions and alkalinity under the provisions of Section 01 45 10.

E. Repair all cracks in substrate under the provisions of Section 03 35 10.

F. Joint and Crack Preparation:

1. Moving Joints: Honor all expansion and isolation joints up through the system, and underlayment and topping.

2. Saw Cuts, Control Joints and Dormant Cracks: Fill all non-moving joints and cracks greater than 1/32 inch with manufacturer's approved cementitious filler. Once cracks and joints have been properly filled, allow these areas to cure prior to proceeding with installation of system.

G. Based on moisture test results, mark areas to receive moisture correction system with chalk line. Indicate which System Type is required.

H. Moisture Absorption Testing: Testing must be performed throughout chalked off areas. Test by applying drops of water. Water should penetrate into concrete in less than 2 minutes.
1. Should test fail, contact system manufacturer for cleaning recommendations.

I. Areas to receive moisture corrective system shall be not less than 65 deg F nor more than 80 deg F for 48 hours before commencing installation.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of substrate conditions.

B. Install in accordance with manufacturer's written instructions.

C. Where system stops, terminate under centerline of door and at wall edges.

3.4 CLEANING & PROTECTION

A. Clean in accordance with manufacturer's written instructions.

B. Prior to installation of underlayment or topping, or finish flooring or sealer, protect installed system from abuse by other trades by use of plywood, Masonite or other suitable protection course.

END OF SECTION

SECTION 07 52 00 MODIFIED BITUMEN MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Provide modified bitumen membrane roofing in accordance with the Contract Documents.
- B. Work Included:
  1. Cold adhesive and torch applied 2-ply SBS modified bitumen built-up roofing system, with aluminum-faced SBS modified bitumen flashing sheet.
  2. Rigid insulation and cover board assemblies – both flat stock and tapered.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B Section 03 30 00 - CAST-IN-PLACE CONCRETE: for concrete substrate.
- C. Section 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY: for pressure treated wood blocking.
- D Section 07 62 00 - SHEET METAL FLASHINGS & TRIM: for sheet metal flashings, copings and seismic joint materials.

1.3 REFERENCES
- A. Reference Standards shall be latest published edition at issue date of Contract Documents.
- B. ASTM International (ASTM):
  1. ASTM C728, Standard Specification for Perlite Thermal Insulation Board.
  2. ASTM 41, Standard Specification for Asphalt Primer Used for Roofing, Damproofing, and Waterproofing.
  3. ASTM D312, Standard Specification for Asphalt Used in Roofing.
  4. ASTM D3617, Standard Specification for Sampling and Analysis of Built-Up Roof Systems During Application.
  5. ASTM 4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- C. FM Global (FM):
  1. FM 4470, Approval Standard for Class 1 Roof Covers.
- D. International Code Council (ICC):
  1. International Building Code (IBC), as amended by State of Washington.
  2. International Energy Conservation Code (IECC), as amended by State of Washington.
- E. National (NRCA):
  1. ARMA/NRCA Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing.
  2. Roofing and Waterproofing Manual"
- F. Roofing Terminology:
  1. Refer to ASTM D1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing Work in this Section.
- G. Washington State Administrative Code (WAC):
  1. WAC Chapter 51-11, Washington State Energy Code.

1.4 QUALITY ASSURANCE
- A. Manufacturer: Soprema, Inc., shall be the primary roofing manufacturer and their products are the basis of this Specification. No Substitutions.
  1. Manufacturer shall have qualified regional technical representative who will come to Project Site for purposes of advising Installer and perform inspections as required for warranty.
  2. The manufacturer’s guide specification is adopted by reference.
  3. Obtain primary products, including each type of roofing ply sheet, bitumen, and adhesive, membrane flashings from a single manufacturer, or with primary manufacturer’s endorsement. Provide secondary products as recommended and approved by the primary manufacturer for the specified roof systems.

4. A technical representative of materials manufacturer shall periodically observe work in progress.

B. Installer: Installer Qualifications and Requirements:
1. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
2. In continuous business under same name for past 3 years.
3. Completed at least 3 successful installations of specified materials and systems on projects of similar scope.
4. Contractor shall provide all personnel trained in application of materials and systems and shall maintain supervision as specified elsewhere.
5. Installer Field Supervision: Require Installer to maintain full-time supervisor / foreman on job site during times that modified bituminous roofing systems installation is in progress, and who is experienced in installation of specified roofing systems.
6. Technical representative, as a minimum, shall be present to observe deck preparation, general installation procedures, and final completion; submit documentation of manufacturer's final acceptance. Work shall not proceed until such observations have been made and conditions have been approved in writing by manufacturer.
7. Technical representative shall perform a punch list inspection upon Project Substantial Completion indicating all items in need of attention, including conformance to manufacturer's written installation instructions and these Contract Documents; provide documentation.
8. Work shall not proceed until such observations have been made and conditions have been approved in writing by the manufacturer.

C. UL Listing: Class A rated roofing assembly.

D. FM Global Requirements:
1. Wind Category: Class I-60: Roof systems shall be attached to resist twice the following uplift pressures (safety factor of two):
   a. 40 pounds per square foot within 10 foot perimeter.
   b. 25 pounds per square foot for balance of roofs.
2. Class I assembly, noncombustible.

E. Roof details and installation shall be reviewed and approved by FM Global. Submit one (1) copy of roofing Submittals and schedule inspection with FM Global, 601 - 108th Avenue NE, Suite 1400, P.O. Box 96077, Bellevue, WA 98004, telephone (425) 455-5333, fax (425) 454-7847.

1.5 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Submit Specifications, installation instructions and general recommendations from manufacturers of membrane roofing system materials, insulation and insulation adhesive. Include data substantiating that materials comply with Specification requirements and compatibility. Include installation details for accessory materials.

C. Shop Drawings: Submit manufacturer's standard details as applicable to this Project and special details that are required by Project design and which are approved by primary roofing materials manufacturer. Details shall be referenced to specific locations on the Roof Plan. Indicate all conflicts where manufacturer objects to details on Contract Documents.

D. Specimen copies of specified warranties.

E. Inspection Report: Copy of roofing system manufacturer's Inspection Report of completed roofing installation.

1.6 PROJECT / SITE CONDITIONS

A. Weather: Proceed with roofing Work when existing and forecasted weather conditions permit Work to be performed in accordance with manufacturer's' recommendations and warranty requirements.

1.7 PRODUCT HANDLING

A. Handle and store material and equipment in a manner that avoids concentrated loads on roof surface or installed insulation that might cause permanent deformation**.**
   1. Deliver roofing materials to Project Site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
   2. Do not leave unused insulation, felts, and other sheet materials on roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources.

1.8 WARRANTIES

A. Manufacturer's Warranty: Upon successful completion of the Work to manufacturer's satisfaction and receipt of Final Payment, the manufacturer's standard 15-year warranty shall be issued.

B. Installer Warranty: The Installer shall supply the Owner with a separate 5-year workmanship warranty. In the event any Work related to roofing, flashing or metal is found to be within the warranty term, defective or otherwise not in accordance with the Contract Documents, Installer shall repair that defect at no cost to Owner. The Installer's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer.

C. Adhesion Warranty: Provide a 10-year adhesive manufacturer's labor and material warranty, countersigned by the Installer, agreeing to remove and replace damaged portions of the roof which resulted solely from failure of adhesion of the roof insulation.

D. Owner Responsibility: Owner shall notify the primary roofing manufacturer and the Installer of any leaks as they occur during the time period when both manufacturer's and Installer's warranties are in effect.

PART 2 - PRODUCTS

2.1 ROOFING MEMBRANE & FLASHING

A. Soprema, Inc., Field System 2455 (Elastophene 180 PS set in FMA adhesive & Elastophene Flam FR GR)
   Soprema, Inc. Base Flashing Specification
   2457 (Elastophene 180 PS & Sopralast 50 TV Alu)

2.2 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Roofing Asphalt: ASTM D312, Type III or IV

C. Cold Adhesive: FMA Adhesive by Soprema, Inc.

D. Asphalt Primer: To meet ASTM D41.

E. Water Cut-Off: Sopracolle or Sopramastic.

F. Walkpad Membrane: Soprawalk.

G. Sealant in contact with roof membrane materials: Neoprene as manufactured by Gibson–Gardner.

H. Cleaning Solution: Non-phosphate cleaning solution.

I. Fiber Cants: Rigid perlite board of same composition as overlay board, 3-inch vertical (with 3 7/8-inch face) minimum, and as shown on Drawings.

J. Tapered Edge Strip: Rigid perlite or wood fiber board, sizes as required to provide tapered transition where indicated on Drawings.
K. Pipe Flashings: 2-piece, 4 lb. de-silvered lead flashing.
L. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion resistance provisions in FMG 4470, designed for fastening roofing membrane components to associated substrate, tested by manufacturer for required pull-out strength, and acceptable too roof system manufacturer.
M. Roofing granules: Ceramic coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, white.
N. Miscellaneous Accessories: Provide those recommended by the roofing system manufacturer.

2.3 TAPERED INSULATION & COVER BOARD
A. Provide tapered 48 x 48 inches boards to provide slope-to-drain where indicated, fabricated with taper of 1/4 inch per foot in one direction. Use combination of flat and tapered boards at large crickets.
B. Polyisocyanurate Rigid Board Insulation: 2- layer, rigid boards of minimum 2.0 pounds per cubic foot density closed-cell foam core, permanently bonded to roofing felt or fiberglass-faced sheets. Facing shall be approved by manufacturer of roofing.
1. Johns Manville E'nrg'y 2 Plus, Atlas Acfoam Composite are acceptable products.
2. Insulation units shall be installed in two consecutive and separate layers, with joints of each layer offset from previous layer of insulation.
C. Cover Board: ASTM C728 perlite board, 3/4-inch thick, seal coated.
D. Thickness and R-Values:
1. Bottom layer: 2.0 inches, R-15.3 min./max..
2. Top layer: 1.5 inches, R-14.8 min./max.
3. Cover board: 3/4 inches.
E. Board Size: 48 x 48 inches.
F. Adhesive: Insta-Stik by Flexible Product Company.
1. Soprema FMA insulation adhesive may be used subject to specified warranty requirement.
G. Asphalt Adhesive: Asphalt: ASTM D312, Type III or IV

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
2. Verify that cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
5. Test for moisture by pouring 1 pint (0.5 L) of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
C. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft. and allow primer to dry.

3.3 TAPERED INSULATION INSTALLATION
A. General: Extend insulation over entire surface to be insulated, as indicated on Drawings, cutting and fitting tightly around obstructions.
1. Form crickets and saddles with tapered insulation as shown and as required for proper drainage of membrane.
2. Stagger joints in both directions between courses with no gaps to form a complete thermal envelope. Limit joints between adjacent units to 1/4 inch maximum.
3. Form drain sumps as shown on the Drawings; cut overlay board to form rectangular sump, and install tapered edge strips at perimeter of sump, stacked to achieve insulation thickness.
B. Attach bottom layer of rigid board insulation to concrete deck with hot asphalt.
C. Adhere top layer of rigid board insulation with adhesive in strict accordance with adhesive manufacturer’s printed directions.
D. Fully adhere cover board to underlying insulation. Offset joints of cover board a minimum of 1-foot from the joints of the underlying insulation units. Joints of overlay board shall be butted tight; leave no more than 1/8-inch gap between abutting boards, maximum. Joints exceeding 1/8” shall be filled with insulation.
E. Insulation cant strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees.
F. Install cricket materials behind curbs exceeding 2-feet in width, and as indicated on drawings, to aid in roof drainage.
G. Crickets shall be fully adhered to underlying cover board insulation. Joints shall be butted tight; gaps exceeding 1/8-inch shall be filled with insulation.
H. Cricket materials shall be installed to result in no less than 3/8-inch per foot, finished slope.
I. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict the flow of water.
J. Do not install more insulation and cover board than can be covered with roof membrane by the end of day or at onset of inclement weather.
K. The installation shall cause the insulation boards to rest evenly on the roof deck / substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards in all sides and walked-in-place to assure even and consistent contact with the substrate.

3.4 INSTALLATION OF ROOFING
A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Pay particular attention to seam sealing.
B. Roofing Plies:
1. All layers of roofing shall be laid free of wrinkles, creases, or fish mouths and shall be laid at right angles to the slope of the deck.
2. Sheets shall be laid directly behind the adhesive applicator. Sufficient pressure shall be exerted during application, using an aluminum rake or broom, to ensure prevention of air pockets.
3. Sheets shall be fully bonded to the prepared substrate and each other and shall have a minimum of 3-inch side and 6-inch end laps.
4. Lap seams of the layers shall not be stacked; stacked laps shall be sufficient cause for rejection of the roof.

4. Install roofing membrane sheets so side and end laps shed water.
5. Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps.
6. Application of roofing shall immediately follow application of insulation and overlay board assembly as a continuous operation.
7. Adhesive installation shall be, nominally, 24 mils per 1-1/2 gallons per square and 32 mils per 2 gallons per square, and shall be total in coverage leaving no breaks or voids.
8. Apply roofing granules to cover exuded bead at laps while bead is tacky (carry a granule bag during application of top ply sheet).
9. Prime metal flanges with a uniform coating of asphalt primer.
10. Set each ply sheet, in a solid uniform coating of adhesive. Laps shall not buck water and shall be totally sealed.
11. The top ply sheet shall be fully bonded to the base ply sheet surface, and shall have a minimum of 3-inch side and 6-inch end laps.
12. Provide a continuous reinforcing sheet in all waterways.
13. Install valley reinforcing sheets over base ply sheet prior to installation of top ply sheet.
14. Do not install top ply sheet until an inspection of reinforcing sheets has been conducted.
15. Step in all T-joints. T-joints shall be fully sealed and without voids. Other methods to improve T-joint seal include a 45-degree cut and finish asphalt application at joint area.
16. At end of the day's work or when precipitation is imminent, a water cut-off shall be built at all open edges. Cut-offs can be built using adhesive or plastic cement and non-porous roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

B. Roof Drain:
1. Roof Drains: Set 30-by-30-inch square metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
2. Install stripping according to roofing system manufacturer's written instructions.

C. Flashing:
1. Bridge junctures of vertical and horizontal surfaces with 45-degree cant strips.
2. Install reinforcing sheets at horizontal to vertical transitions, including curbed penetrations and flange type penetrations.
3. Prime the horizontal surface of the top ply sheet at the horizontal to vertical transition with manufacturer approved asphalt primer prior to initiating installation of flashing sheet. Apply the asphalt primer at a rate of 1 gallon per 100 square feet.
4. Install flashing sheets over reinforcing sheets and top ply sheet at horizontal to vertical transitions. Extend a minimum of 8 inches up vertical surfaces, and a minimum of 6 inches onto the primed roof membrane. Extend to top of walls where indicated on drawings.
5. Secure top edge of flashing sheets at vertical surfaces at 8 inches on center using fasteners appropriate to the substrate.
6. Provide corner patches or folded corners at base flashing corners. Blind cut corners are not acceptable. Folded corner tabs shall be cut so that tabs do not exceed 4 inches.
7. Install aluminum foil clad flashing sheets using torch method and pressing in with damp sponge or cloth, as recommended by roof materials manufacturer. Avoid causing delamination of foil surface from underlying membrane. Ensure correct directional orientation of foil clad flashing sheets.

3.5 FINISH INSTALLATION

A. Top Ply Sheet and Flashing Sheet Finish:
   1. Apply metallic powder / granules at all laps to cover and protect all exposed asphalt. An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project.
   2. Make necessary preparations, utilize recommended application techniques, apply specified materials (i.e. granules, metallic powder, etc.), and exercise care in ensuring that the finished application is acceptable to Contracting Officer.

B. Walk Pad Installation:
   1. Install walk pads at roof access locations, roof access ladders, and as otherwise shown on Drawings.
   2. Install walk pads fully adhered to surface of membrane, or as recommended by roof materials manufacturer, leaving minimum 3 inch / maximum 4 inch gap between edges of individual walk pads for proper drainage.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
   1. Approximate quantities of components within roofing membrane will be determined according to ASTM D3617.
   2. Test specimens will be examined for interply voids according to ASTM D3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

C. A roof inspection is required by manufacturer before warranty issue. Revise scope of inspection and source of report to a qualified roofing consultant or an independent testing and inspecting agency if preferred.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit Report to Contracting Officer.
   1. Notify Owner 48 hours in advance of date and time of inspection.

E. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

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

3.7 PROTECTING & CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Contracting Officer.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

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

D. Remove trash, nails, debris, and equipment from Site and leave Site clean.

3.8 COMPLETION

A. Prior to demobilization from Site, Work shall be reviewed by Contracting Officer and Installer. All defects and non-compliance with Specifications or recommendations of roofing manufacturer shall be itemized in a Punch List. These items must be corrected immediately by Installer to satisfaction of Contracting Officer prior to demobilization.

END OF SECTION

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APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

CONTACT INFORMATION: **INDEX NUMBER:**

ROOFING CONTRACTOR (NAME & ADDRESS)	TELEPHONE NO.:	**FAX:**
	E-MAIL ADDRESS:	**CONTACT:**
CLIENT (NAME & ADDRESS)	TELEPHONE NO.:	**FAX:**
	E-MAIL ADDRESS:	**CONTACT:**

OVERVIEW OF WORK: *(Submit 1 form per roof area)*

Building Name & Number:		
Building Dimensions: Length: *ft/m;*	Width: *ft/m.;*	Height *ft/m.*
Roof Slope:		
Parapet Height ,max *(in./m)*:	Parapet Height ,min *(in /m):*	
Type of Work: ☐ New Construction ☐ Recover (New roof over existing Roofing System) ☐ Reroof (New cover/remove existing roofing system to deck) ☐ Other		
FM Approved RoofNav Assembly Numbers:		

ROOF SURFACING:

☐ None	
☐ Coating	*(Trade Name/Application Rate)*
☐ Granules	*(Application Rate)*
☐ Gravel/Slag	*(Application Rate)*
☐ Ballast: ☐ Stone Size ☐ Pavers *(Beveled or square edge)*; ☐ Other:	
Ballast Weight (psf): Field: Perimeter: Corners:	

ROOF COVER/MEMBRANE:

(Please provide ALL applicable details including trade name, type, number of plies, thickness, reinforced, adhesive)

☐ Panel: ☐ Through Fastened Metal ☐ Standing Seam metal ☐ Fiber Reinforced Plastic (FRP) ☐ Other:			
☐ Built Up Roofing (BUR)			
☐ Modified Bitumen			
☐ Single Ply:	☐ Adhered	☐ Fastened	☐Ballasted
☐ Spray Applied			
☐ Other:			

BASE SHEET:

(Please include Trade Name, Type, and Width)

☐ None		
Trade Name:		Width: ☐ 36 In. ☐ 1 meter (39 In.)
☐ Fastened		☐ Adhered
☐ Secured per RoofNav	**OR**	☐ Per FM Global Loss Prevention Data Sheet 1-29
Comments:		
☐ Air Retarder		
☐ Vapor Retarder		

INSULATION

Layer	**Trade Name**	**Thickness (In.)**	**Fastened**	**Adhered**	**Tapered**
1. Top			☐	☐	☐
2. Next			☐	☐	☐
3. Next			☐	☐	☐
4. Next			☐	☐	☐

☐ Glass Fiber/Mineral Wool/Batt	☐ Facer Type/Vapor Barrier
☐ Thermal Barrier	
☐ Other:	
☐ None	

APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

DECK:

(Please include manufacturer, type, yield strength, thickness/gage, etc.)

☐ Steel:	
☐ LWIC (Form Deck):	☐ Cementitious Wood Fiber:
☐ Concrete: ☐ Pre-cast panels or ☐ Cast in Place	
☐ Wood	
☐ Fiber Reinforced Cement	☐ Fiber Reinforced Plastic
☐ Gypsum: ☐ Plank	☐ Poured
☐ Other:	
Comments:	

ROOF STRUCTURE (Include Size, Gage, Etc.):

☐ Purlins ☐ "C" OR ☐ "Z"		
☐ Joists ☐ Wood OR ☐ Steel		
☐ Beams ☐ Wood OR ☐ Steel		
☐ Other:		
Spacing: Field:	Perimeter:	Corners:
Comments:		

FASTENERS USED IN ROOF ASSEMBLY:

Roof Cover Fasteners: Trade Name:		Length:	Diameter:
Stress Plate/Batten:			
Spacing: Field: **X**	Perimeter: **X**	Corners: **X**	
Insulation Fasteners: Trade Name:		Type:	
Size:		Stress Plate:	
Spacing: Field:	Perimeter:	Corners:	
Deck Or Roof Panels Fasteners: Trade Name:		Type:	
Length:		Size Washer:	
If Weld: Size:	Weld:	Washer:	
Deck Side Lap Fasteners: Field: **X**	Perimeter: **X**	Corners: **X**	
Spacing: Field: **X**	Perimeter: **X**	Corners: **X**	
Base Sheet Fasteners Trade Name:		Type:	
Head Diameter:		Length:	
Spacing: (Attached Sketches as necessary) Spacing Along Laps: Field:		Perimeter:	Corners:
No. Intermediate Rows: Field:		Perimeter:	Corners:
Spacing Along Intermediate Rows: Field:		Perimeter:	Corners:

PERIMETER FLASHING:

(Attach a detailed sketch of metal fascia, gravel stop, nailer, coping, etc.)

☐ FM Approved Flashing	☐ Per FM Global Loss Prevention Data Sheet 1-49
☐ Other:	Comments:

DRAINAGE:

For new construction: Has roof drainage been designed by a Qualified Engineer per FM Global Loss Prevention Data Sheet 1-54 and the local building code? ☐ Yes ☐ No (Attach details)
For re-roofing and recovering: will the roof drainage be changed from the original design (for example: drain inserts, drains covered or removed, new expansion joints, blocked or reduced scupper size? ☐ Yes ☐ No If yes, were the changes reviewed by a Qualified Engineer? ☐ Yes ☐ No (Attach details)
Is secondary (emergency) roof drainage provided per FM Global Data Sheet 1-54? ☐ Yes ☐ No (Attach details)

Signature of Property Owner: _____

Title: _____ Date: _____

Signature of Installing Contractor: _____

Title: _____ Date: _____

APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

FM Global OFFICE REVIEW
(Please leave blank for FM Global Office Review)
WIND:

Design Wind Speed: *(mph)*	Ground Terrain: ☐ B ☐ C ☐ D
Uplift Pressure in field: *(psf)*	Uplift Rating Required:
Adequate Uplift Rating Provided:	Adequate? ☐ Yes ☐ No

FIRE:

Internal Assembly Rating:	☐ Class 1	☐ Class 2	☐ Non-Combustible	
External Fire Rating:	☐ Class A	☐ Class B	☐ Class C	☐ None
Concealed Spaces?	☐ Yes	☐ No	Sprinklers below Roof?	☐ Yes ☐ No
Adequate?	☐ Yes	☐ No		

HAIL:

Hail Rating Needed?	☐ SH	☐ MH	☐ None	Hail Rating Provided?	☐ SH ☐ MH ☐ None
Adequate?	☐ Yes	☐ No			

COLLAPSE:

If standing seam, has collapse been reviewed? ☐ Yes ☐ No

COMMENTS:

Reviewed By: _____

Date: _____

FM Global Field Review:
(Leave blank for on-site review by FM Global Loss prevention Consultant):

System installed per reviewed/accepted plans? ☐ Yes ☐ No
If no, explain:

Installation witnessed by FM Global? ☐ Yes ☐ No

Uplift test needed? ☐ Yes ☐ No

(Uplift testing is REQUIRED for applicable new and recover roofs in hurricane, typhoon or tropical cyclone prone regions (see DS 1-29 and 1-52 for more information)

Uplift testing satisfactorily completed ☐Yes ☐ No ☐DNA

If yes, note pressures held for the: Field_____ Perimeter _____ Corners _____
If no, explain and provide required and obtained uplift pressures and other details and attach to this form.

Reviewed By: _____

Date: _____

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SECTION 07 62 00 SHEET METAL FLASHING & TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Provide sheet metal flashings and trim in accordance with the Contract Documents:
   1. Roof copings.
   2. Counter flashings.
   3. Roof edge flashings (gravel stop).
   4. Wall cladding.
   5. Internal gutter.
   6. Exterior expansion joint cover.
   7. Custom fabricated roof expansion joint covers.
   8. Metal clad weather barrier.
   9. Self-adhering membrane flashing.

B. Where not otherwise indicated, provide and install sheet metal flashings and trim in accordance with generally accepted industry standard details as indicated in SMACNA Architectural Sheet Metal Manual, NRCA Membrane Roof Systems, and primary roofing manufacturer's published details at all exterior openings, penetrations through exterior walls and roofing, exterior joints, copings, caps of parapets and other systems.

1.2 RELATED SECTIONS:

A. Drawings, General Conditions and Division 01 apply to Work in this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Product data.
C. Section 01 33 12 - COORDINATED SUBMITTAL REQUIREMENTS: for submittals of this Section are affected by coordinated simultaneous submittal requirements.
D. Retain Sections in subparagraphs below that contain requirements Contractor might expect to find in this Section but are specified in other Sections.
E. Section 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY for pressure treated wood blocking.
F. Section 07 41 13 - METAL ROOFING: Ridge flashing and gutters.
G. Section 07 52 00 - MODIFIED BITUMEN MEMBRANE ROOFING: installation of sheet metal flashing and trim integral with membrane roofing.
H. Section 07 53 23 - EPDM MEMBRANE ROOFING: installation of sheet metal flashing and trim integral with membrane roofing.
I. Section 09 06 09 - EXTERIOR ARCHITECTURAL COLORS & MATERIALS SCHEDULE: for selected finish colors.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. ASTM International (ASTM):
   1. ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
   2. ASTM A653 / A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   3. ASTM A755 / A755M, Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
   4. ASTM B32, Standard Specification for Solder Metal.
C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
   1. Architectural Sheet Metal Manual.

1.4 QUALITY ASSURANCE

A. Standards: Comply with the Standards listed under Article 1.4 of this Section as applicable, unless otherwise shown or specified.

B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.5 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1.6 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Qualification Data: For qualified fabricator.

E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.7 DELIVERY, STORAGE, & HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Zinc coated (galvanized) steel sheet (for concealed cleats): 22 gauge; ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

C. Pre-painted, metallic coated steel sheet (for Type A Copings and counter flashings): steel sheet metallic coated by the hot dip process and pre-painted by the coil-coating process to comply with ASTM A755/A755M.

1. High-Performance Organic Finish: Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below.

1) Humidity Resistance: 1000 hours.

2) Salt-Spray Resistance: 1000 hours.

2. Colors: Selected from manufacturers full range of standard colors, unless otherwise indicated in below sections, and as approved by Owner.

D. Smooth 5005-H34 ASTM B209 alloy aluminum (for Type B Copings): 0.060 inch thick, with fluoropolymer finish.

E. Stainless-Steel Sheet: Type 304 complying with ASTM A167.

1. Two-Piece Counter Flashings: 0.021-inch thick. Soldered joints complying with ASTM B32.

2. Saw-Cut or Precast Reglet (at concrete): Min. 0.025-inch thick soft temper, standard uncoated finish, Grade 2D.

3. Internal Gutter: Min. 0.025-inch thick, mill finish.

F. “CO” Concrete Reglet by Fry Reglet.

G. Splice Plates: Same metal as coping, for Type A and Type B, respectively.

2.2 UNDERLAYMENT MATERIALS

A. Felts (to separate dissimilar metals): ASTM D226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering Underlayment (for vertical planes and transitions and parapet walls): High-temperature sheet, minimum 40 mil (1.0-mm-) thick, polyethylene film laminated to layer of rubberized asphalt adhesive; maximum permeance rating of 0.1 perm (6 ng/Pa x s x sq. m); cold-applied with slip-resisting surface and release-paper backing.

1. Provide primer when recommended by vapor-retarder manufacturer; 36-inch wide rolls.

2. Provide material that can withstand high in-service temperatures for extended periods of time.

3. Thermal Stability: ASTM D1970; stable after testing at 240 deg F .

4. Low-Temperature Flexibility: ASTM D1970; passes after testing at minus 20 deg F.

5. Products: Subject to compliance with requirements:

a. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.

b. Or Approved.

C. EPDM Sheet: ASTM D4637, Type II, scrim or fabric internally reinforced, uniform, flexible, 45 mil. thick, black (for installation at the internal gutter).
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Carlisle Syntec, Inc.
      b. Firestone Building Products
      c. Johns Manville
      d. Or Approved.

D. Heat Protection Sheet: Asbestos or other heat protection sheet, which can provide sufficient protection to guard against heat damage during in place welding.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
   4. Fasteners forZinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329 or Series 300 stainless steel.

C. Solder:
   1. For Stainless Steel: ASTM B32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
   2. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Metal Clad Weather Barrier: Basis of Design: HE200AM by, www.Henry.com.

G. Self-Adhered Vapor Permeable Air Barrier Membrane: for transition and joint treatment, a self-adhering membrane consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water.
   1. Blueskin Breather manufactured by Henry Co. www.Henry.com.

H. Self-Adhered Membrane Flashing: 40 mils, SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film.
   1. Blueskin TWF by Henry Co. www.Henry.com.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate concealed cleats from Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality; 22 gauge.

G. Seams for Stainless Steel and Lead: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

I. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Internal Gutters: Fabricate in continuous sections, prepped and formed to accept welded seams at all connections and penetrations complete with end pieces, outlet tubes, and other special accessories as required. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
1. Fabricate gutters with built-in expansion joints.
2. Sheet Metal: Stainless Steel: 0.025 inch thick.
3. Color: Selected from manufacturers full range of standard colors and as approved by Owner.

B. Downspouts: Fabricate downspouts in profiles as indicated on the Drawings complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Sheet Metal: Stainless Steel: 0.025 inch thick.
2. Color: Selected from manufacturers full range of standard colors and as approved by Owner.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (gravel stops): Fabricate with profiles as shown on the Drawings and of Type A coping metal with front cleats as used for copings.
1. Joint Style: Lapped 4 inches wide and sealed.
2. Sheet Metal: Prepainted, metallic-coated sheet, 24 gauge.
3. Color: Selected from manufacturers full range of standard colors and as approved by Owner.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
1. Fabricate thick wall copings for flat lock seams.

2. Where copings butt against higher walls, fabricate closed-end splices (saddles) for attachment to the higher wall.
3. Where walls terminate, provide finish ends with level tops and bottoms to match front of coping.
4. Type A Copings:
   a. Joint Style: Standing seam - minimum 1-inch high with folded and sealed seams.
   b. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.
   c. Color: Color as scheduled in Section 09 06 09.
5. Type B Copings:
   a. Joint Style: Joint Style: Butt with 12-inch wide concealed backup plate – centered over butt joint.
   b. Sheet Metal: Alloy aluminum, 0.060 inch thick
   c. Color: Match color of metal panels.

C. Wall Panels: Fabricate with profiles as shown on the Drawings.
1. Joint Style: S-locks at 48-inches on center - minimum 1-inch wide and fully sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.
3. Provide vertically oriented breaks in sheet metal panels to control oil-canning; breaks to occur at 24-inches on center.
4. Color: Selected from manufacturers full range of standard colors and as approved by Owner.

D. Two Piece Counter flashing: Fabricate with profiles as shown on the Drawings and per SMACNA or use manufactured flashing, consisting of a receiver and a removable counter flashing.
1. Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

E. Reglet Counter Flashing: Fabricate with profiles as shown on the Drawings.
1. Joint Style: Lapped and sealed.
2. Sheet Metal: Cast-in Reglet Style and Manufacturer:
   a. “CO” Concrete Reglet by Fry Reglet.

F. Vent Pipes and Electrical Conduits: Performed lead type pipe flashings pre-manufactured w/ two-piece design; fabricated to conform to slope requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.
8. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of stainless-steel, uncoated aluminum, and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Self-adhering underlayment: Install over all substrate where changes in plane occur, such as parapet wall transitions, wall penetrations, etc.

D. EPDM Sheet: Install inside internal gutter where indicated on the Drawings. Utilize heat protection sheet to protect underside of EPDM sheet from weld damage.

E. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

F. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

G. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with project requirements.

H. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
2. Pre-tinning is not required for lead.
3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

I. Rivets: Rivet joints in where indicated and/or where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Internal Gutters: Join sections with welded seams. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.

1. Install heat protection sheet under all weld locations during in place welding.
2. Install EPDM sheet layer in internal gutter trough and extend to drip edge at eaves. Lap ends a minimum of 4 inches. Fasten with roofing nails.
3. Anchor gutter system as indicated on the Drawings.
4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart.
5. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
2. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counter flashing: Coordinate installation of counter flashing with installation of base flashing. Insert counter flashing in reglets or receivers and fit tightly to base flashing.

F. Gravel Stops:
1. Interlock exterior bottom edge of gravel stops with continuous cleats anchored to substrate at 24 inches on center.
2. Embed roof edge into mastic provided under Division 7 roofing Section, and nail into wood blocking at 4 inches on center.

G. Cast-in Reglet: Cover with foam backer rod during concrete pour to prevent grout and concrete from settling in reglet opening.

H. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 CLEANING & PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 07 81 00 APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Bidder-designed applied fireproofing. See requirements of Section 01 36 00.
- B. Concealed SFRM.
- C. Exposed SFRM.
  1. Thickness of fireproofing shall be bidder determined and submitted with UL or approval of agency documentation.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
- C. Section 01 36 00 - DELEGATED DESIGN REQUIREMENTS: for bidder-design requirements.
- D. Section 05 12 00 - STRUCTURAL STEEL: for substrate to receive sprayed-on fireproofing.
- E. Section 05 31 00 - METAL DECKING: for substrate to receive sprayed-on fireproofing.

1.3 DEFINITIONS
- A. The following definitions apply to Work of this Section and are based on IBC Table 601:
  1. Structural frame: The structural frame shall be considered to be the columns, girders, beams and spandrels having direct connections to the columns and bracing members designed to carry gravity loads.
  2. Secondary members: Secondary members shall be beams of floor and roof systems which have no connection to the columns and are not a part of the structural frame. Ledge angles supporting floors or roof, bracing members that provide lateral stability to roof or floor beams, including connections shall be considered secondary members.
- B. SFRM: Spray fire-resistive material.
- C. Concealed: Fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed and have not been defined as exposed.
- D. Exposed: Fire-resistive materials applied to surfaces that are exposed to view when the Work is completed, that are in elevator shafts and machine rooms, that are in mechanical rooms, and that are in air-handling plenums.

1.4 REFERENCES
- A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
- B. ASTM International (ASTM):
  1. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  2. ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
  3. ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Deg C.
  4. ASTM E605, Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
  5. ASTM E736, Standard Test Method for Cohesion / Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
  6. ASTM E759, Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
  7. ASTM E760, Standard Test Method for Effect of Impact Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
  8. ASTM E761, Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.

9. ASTM E859, Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
10. ASTM E937, Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
11. ASTM G21, Standard Practice for Determining Resistance to Synthetic Polymeric Materials to Fungi.

C. International Code Council (ICC):
1. International Building Code (IBC), as amended by State where Project is located.

1.5 REGULATORY REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide SFRM with fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to Authorities Having Jurisdiction. Identify bags containing SFRM with appropriate markings of applicable testing and inspecting agency.
1. Fire-Resistance Ratings: Indicated by design designations from UL Fire Resistance Directory, FM's "Approval Guide, Building Materials," or from listings of another testing and inspecting agency acceptable to Authorities Having Jurisdiction, for SFRM serving as direct-applied protection tested per ASTM E 119.

B. Surface-Burning Characteristics: ASTM E 84.

C. Requirements of Regulatory Agencies: Comply with UL test requirements and ICC-ES approval requirements. Submit all necessary materials and test data as may be required by governing authority, to obtain approval to apply sprayed-on fireproofing. Provide coverage and thickness as required by governing authority to obtain fire ratings specified herein.
1. Fireproofing thickness may be calculated per weight-to-heated perimeter ratios per IBC Section 721.5.1.3.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain SFRM through one source from a single manufacturer.

B. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by SFRM manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
1. A manufacturer's willingness to sell its SFRM to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

C. Special Inspections: The Owner will engage an independent testing and inspection agency to inspect and test the completed installation to determine the density and thickness of sprayed-on fireproofing. Cooperate with the testing laboratory. Thickness of application will be checked in accordance with ASTM E605. Recoat areas where thickness is less than minimum on approved Submittal.

D. SFRM Testing: By a qualified testing and inspecting agency engaged by Owner to test for compliance with specified requirements for performance and test methods.
1. SFRMs are randomly selected for testing from bags bearing applicable classification marking of UL or another testing and inspecting agency acceptable to Authorities Having Jurisdiction.
2. Testing is performed on specimens of SFRMs that comply with laboratory testing requirements specified in Part 2 of this Section and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.

E. Depth, Adhesion and Compatibility Testing: Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
   1. Test for adequate depth per ASTM E605, or as otherwise required by Authorities Having Jurisdiction.
   2. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2 of this Section.
   3. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings used on the steel in this Project to be incompatible with SFRM.

F. Provide products containing no detectable asbestos as determined according to method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

1.7 PERFORMANCE REQUIREMENTS

A. Provide fireproofing material of thickness and density required to achieve fire resistance ratings required by IBC Table 601.

B. For this Project all framing members shall be considered “restrained” per ASTM E119.

1.8 DEFERRED SUBMITTAL

A. For definition of Deferred Submittal see Section 01 42 00.

B. Submit under the provision of Section 01 33 00.

C. Deferred Submittal Documents: Prepare and submit manufacturer’s product data, drawings showing required thickness of fireproofing, and include documentation from ICC-ES or other approved agency substantiating the sizing of fireproofing.
   1. Framing plans: Obtain and pay for reproducible plans of structural framing plans and indicate thickness of fireproofing on beams and columns.
   2. Building official approval: Provided the submittal is satisfactory and complete, the Architect or Structural Engineer will stamp the submittal with their respective review stamp and submit it to the Building Official for approval.
   3. Distribution: Upon approval by Building Official, distribute copies of approved Submittal to all concerned trades, including one set to Special Inspector.

1.9 INFORMATIONAL SUBMITTALS

A. Submit under the provision of Section 01 33 00.

B. Qualification Data: For Installer.

C. Product Certificates: For each type of fireproofing.

D. Evaluation Reports: For fireproofing, from ICC-ES.

E. Pre-Construction Test Data: Submit, upon request by Architect, certified copies of laboratory tests of sprayed-on fireproofing as specified herein for the following:
   1. Corrosion resistance.
   2. Deflection.
   3. Bond impact.
   4. Bond strength.
   5. Air erosion.
   6. Compressive strength.
   7. Surface burning characteristics.

F. Field quality-control reports.

1.10 CLOSEOUT SUBMITTALS

A. Submit under the provisions of Sections 01 77 00 and 01 78 39.

B. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner’s name and registered with manufacturer.

1.11 DELIVERY, STORAGE, & HANDLING

A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.
B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
C. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

1.12 JOB CONDITIONS
A. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
B. Ventilation: Provide ventilation to allow for proper drying of the fireproofing during and subsequent to its application. In poorly ventilated areas lacking natural ventilation, forced air circulation shall be required to achieve a total air exchange rate of four per hour until the material is substantially dry.

1.13 PROTECTION
A. Conduct spraying operations in a manner which protects persons and other work in the vicinity against exposure to spray-on materials by complying with the latest rules and regulations of governing local, state and federal agencies.
B. Protect sprayed-on insulation during the construction period. Fireproofing damaged or removed shall be repaired or replaced to comply with this Specification prior to concealment and prior to date of Final Acceptance.
C. Where adjacent surfaces subject to overspray are to remain permanently exposed, protect these specific surfaces with masks, drop cloths or other satisfactory coverings.

1.14 COORDINATION
A. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.15 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace SFRMs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.

b. Not covered under warranty are failures due to damage by occupants and NIH's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

B. Warranty Period: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to Project requirements, provide SFRM from one of the following:

1. Carboline Co., Fireproofing Products Div., www.carboline.com.
2. Grace, W.R. & Co., Construction Products Div., www.na.graceconstruction.com.
3. Isolatek International Corp., www.isolatek.com.

2.2 MATERIALS - GENERAL

A. Provide materials which have been tested and approved by UL and are listed under their Label Service, and in addition are approved by the local building department having jurisdiction.

B. Material shall be cementitious spray fire-resistive material consisting of factory-mixed, dry formulation of Portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project Site to form a slurry or mortar for conveyance and application and complying with the following minimum requirements.

C. Provide self-adhesive non-flaking, non-dusting type (without the use of organic adhesive on substrate).

D. Provide thickness and density required to provide specified fire rating.

E. Mold Inhibitor: Provide factory-added mold inhibitor tested in accordance with ASTM G21.

2.3 CONCEALED SFRM

A. SFRM characteristics when applied in thickness and density required to achieve specified fire rating.

CONCEALED SFRM CHARACTERISTICS		
Characteristic	Test	Results
Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 10 feet (3 m).
Corrosion-Resistance	ASTM E937	No evidence of corrosion of steel.
Bond Impact	ASTM E760	No cracking, spalling, or delamination.
Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum 200 lbf/ft^2 (9.57 kPa).
Density	ASTM E605	Not less than density specified in the approved fire-resistance design.
Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.025 gm/ft^2 (0.27 gm/m^2).
Compressive Strength	ASTM E761	Minimum compressive strength 1,000 psf (48 kPa).
Surface Burning Characteristics with adhesive and sealer to be used.	ASTM E84	Flame Spread 25 or less. Smoke Developed 50 or less.
Fungi resistance	ASTM G21	Resistance to mold growth when inoculated with *aspergillus niger* (28 days for general application).
Combustion Characteristics	ASTM E136	Noncombustible.

B. Available Products: Subject to Project requirements, products that may be incorporated into the Work include:

1. Pyrolite 15 Series by Carboline Co.
2. Monokote Type MK-6 Series by W.R. Grace & Co.
3. Cafco 300 Series by Isolatek International Corp.

2.4 EXPOSED SFRM

A. SFRM characteristics when applied in thickness and density required to achieve specified fire rating.

EXPOSED SFRM CHARACTERISTICS		
Characteristic	Test	Results
Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 10 feet (3 m).
Corrosion-Resistance	ASTM E937	No evidence of corrosion of steel.
Bond Impact	ASTM E760	No cracking, spalling, or delamination.
Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum 400 lbf/ft^2 (19.15 kPa).
Density	ASTM E605	Not less than density specified in the approved fire-resistance design.
Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.025 gm/ft^2 (0.27 gm/m^2).
Compressive Strength	ASTM E761	Minimum compressive strength 1,000 psf (48 kPa).
Surface Burning Characteristics with adhesive and sealer to be used.	ASTM E84	Flame Spread Index 25 or less. Smoke Developed Index 50 or less.
Fungi resistance	ASTM G21	Resistance to mold growth when inoculated with *aspergillus niger* (28 days for general application).
Combustion Characteristics	ASTM E136	Noncombustible.

B. Available Products: Subject to Project requirements, products that may be incorporated into the Work include:
   1. Pyrolite 22 Series by Carboline Co.
   2. Monokote Type Z-106 Series by W.R. Grace & Co.
   3. Cafco 400 Series by Isolatek International Corp.

2.5 WATER

A. Mixing water shall be clean, fresh and suitable for domestic consumption and free from rich amounts of mineral or organic substances as would affect the set of the fireproofing material.

2.6 ACCESSORIES

A. Provide accessories to comply with manufacturer's recommendations and to meet fire resistance design and Code requirements. Such accessories include, but not limited to:
   1. Bonding agents.
   2. Mechanical attachments.
   3. Substrate primers.
   4. Application aids such as metal lath, scrim, or netting.
   5. Other required or optional items necessary for proper installation.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Examination and Acceptance: Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

B. All surfaces to receive spray-applied fireproofing shall be free of oil, grease, paints / primers, loose mill scale, dirt or other foreign substances which may impair proper

adhesion of fireproofing to substrate. Where necessary, cleaning or other corrections of surfaces to receive fireproofing shall be responsibility of supplier of incompatible substrate.

3.2 PREPARATION

A. Cover other Work which might be damaged by fall-out or overspray of fireproofing materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment and to ensure adequate ambient conditions for temperature and ventilation.
B. Prior to application of fireproofing, clips, hangers, support sleeves and other attachments required to penetrate the fireproofing shall be in place.
C. Ducts, piping, equipment or other suspended matter which would interfere with application of fireproofing materials shall not be positioned until fireproofing Work is complete.
D. Metal Roof Decks: application of fireproofing to underside of metal roof decks shall not commence until roofing is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and construction roof traffic has ceased.

3.3 INSTALLATION

A. Manufacturer's Instructions: Comply with manufacturer's instructions for type of material and condition of substrate in each case. Consult with manufacturer's technical representative at Project Site to determine proper procedure for conditions not fully covered by printed instructions. Record in writing oral instructions received, with copy to Architect and manufacturer.
B. Use spray equipment of type recommended by fireproofing manufacturer.
C. Extend material full thickness over entire substrate to be covered, in a monolithic blanket of uniform texture.
D. Apply exposed sprayed fire-resistive material to produce the following finish: Spray-textured finish with no further treatment.
E. Where full-height partitions terminate at bottom of beams and flutes of metal decking run perpendicular to beams, provide additional fireproofing material to fill flutes of deck above beams. Also fill in deck gaps at beam connections where beams are used as partition closures.
F. Refer to architectural details on Drawings for special conditions where sprayed-on fireproofing may be shown.
G. Work Damaged by Weather: Remove and replace as required at no additional cost to Owner. Temporary protection from weather may be provided at Contractor's option.
H. Cutting and Patching: Recoat fireproofing material that has been removed by other trades for installation of new beams in existing building.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
    1. Testing and inspecting agency will interpret tests and state in each report whether tested Work complies with or deviates from requirements.
B. Special Inspections: Test and inspect as required by ICC Chapter 17.
C. Testing Services: Testing and inspecting of completed applications of sprayed fire-resistive material shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of sprayed-on fire-resistive material for next area until test results for previously completed applications of sprayed-on fire-resistive material show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
D. Remove and replace applications of sprayed-on fire-resistive material where test results indicate that it does not comply with specified requirements for cohesion and adhesion, for density, or for both.
E. Apply additional sprayed-on fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.

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

3.5 CLEANING & REPAIR

A. Cleaning: Immediately upon completion of spraying operations in each containable area of Project, remove over-spray and fall-out of materials from surfaces of other Work and clean exposed surfaces to remove evidence of soiling.

B. Coordinate installation of fireproofing with other Work in order to minimize need for other trades to cut or remove fireproofing. As other trades successively complete installation of their Work, maintain protection of structure afforded by fireproofing by patching any areas which have been removed or damaged prior to concealment of fireproofing by other Work.

C. Repair or replace Work which has not been successfully protected.

END OF SECTION

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SECTION 07 84 13 PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide penetration firestopping in accordance with Contract Documents.

B. Coordinate Work of this Section with Work of other Sections to properly execute Work and maintain hourly ratings of walls and floors where penetration firestopping systems are applied.

C. Protect all penetrations in fire-rated floor and wall assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes and including ducts which are not shown to have fire or combination smoke / fire dampers. Penetrations in concrete slab-on-grade do not require protection.

D. Protect top perimeters of fire-rated partitions.

E. Identification of firestopping systems.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.

B. Section 01 33 00 - SUBMITTAL PROCEDURES: for Architect's review and Contractor submittal of Deferred Submittal to Authorities Having Jurisdiction.

C. Section 01 35 20 – SPECIAL OWNER POLICIES & PROCEDURES: for Firestop Policy.

D. Section 01 36 00 - DELEGATED DESIGN REQUIREMENTS: for bidder design responsibilities.

E. Section 03 30 00 – CAST-IN-PLACE CONCRETE: for penetrations through vertical or horizontal fire-rated concrete assemblies to be firestopped.

F. Section 04 22 00 – CONCRETE UNIT MASONRY: for penetrations through fire-rated concrete unit masonry assemblies to be firestopped.

G. Section 05 31 00 – STEEL DECKING: for penetrations through fire-rated horizontal assemblies consisting of steel decking to be firestopped.

H. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: for penetrations through fire-rated framed gypsum board assemblies to be firestopped.

I. Division 21 - FIRE PROTECTION.

J. Divisions 22-28: Mechanical, Plumbing and Electrical Work: for coordination of penetration firestopping and Work of other trades penetrating fire-rated assemblies.

1.3 REFERENCES

A. Reference Standards shall be latest published edition at issue date of Contract Documents.

B. ASTM International (ASTM):

1. ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

C. FM Global (FMG):

1. FMG Approval Standard 4991, Approval Standard for Approval of Firestop Contractors.

D. International Code Council (ICC):

1. International Building Code (IBC), as amended by State where Project is located.

E. Underwriters Laboratory (UL):

1. ANSI/UL 263, Fire Tests of Building Construction and Materials.
2. ANSI/UL 723, Surface Burning Characteristics of Building Materials.
3. ANSI/UL 1479, Fire Tests of Through-Penetration Fire Stops.

F. Owner's Firestop Policy, refer to Section 01 35 20.

1.4 DEFINITIONS

A. F-Rating: Defined by ASTM E814. as a rating usually expressed in hours indicating a specific length of time that a fire-resistive barrier can withstand fire before being consumed or before permitting the passage of flame through an opening in the assembly. Ratings are assigned to firestop and joint systems by the testing agency based on the specific characteristics of each material or system.

B. T-Rating: Defined by ASTM E814. A measure of the thermal conductivity of a firestop system usually expressed in hours indicating the length of time that the temperature on the non-fire side of a fire-rated assembly does not exceed 325 deg F above ambient temperature. Ratings are assigned to firestop and joint systems by the testing agency based on the specific characteristics of each material or system.

C. L-Rating: Defined in ASTM E814 as the Amount of air leakage through a penetration, measured in cubic feet per minute. The test is administered at ambient and 400 deg F for validity due to variances in performance of firestop systems at different temperatures.

1.5 PERFORMANCE REQUIREMENTS

A. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

B. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.

C. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.

D. Openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.

E. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words “Chase Wall Optional.”

F. Provide through-penetration firestop systems and fire-resistive joint systems subjected to an air leakage test conducted in accordance with the Standards, ANSI/ UL 1479 for penetrations, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the firestop system to restrict the movement of smoke.

G. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or ANSI/UL 1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.

1.6 QUALITY ASSURANCE

A. Standards: Materials shall have been tested by UL or a recognized testing agency in accordance with one or more of the following, as applicable, or have current ICC-ES approval and acceptance by Building Official.
   1. ASTM E814.
   2. UL 1479.

B. Governing Code: IBC Chapter 7, Section 712.

C. Installer Qualifications:
   1. A firm that has been approved by FM Global in accordance with FMG Approval Standard 4991, and experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated or required for this Project, whose work has resulted in construction with a record of successful performance.
   2. Assign installation of through-penetrtation firestop systems and fire-resistive joint systems in Project to a single qualified installer.

D. It shall be sole responsibility of General Contractor to verify, to the satisfaction of Contracting Officer, that all penetrations of each Trade through fire-rated construction assemblies have been properly firestopped and identified (labeled) along entire alignment of installation.

E. Comply with requirements of Owner Firestop Policy, included under Section 01 35 20.
   1. Obtain list of approved firsetopping systems from Contracting Officer.

F. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated or required, through one source from a single manufacturer.

1.7 REGULATORY REQUIREMENTS

A. Minimum Required F and T (fire and temperature) Ratings:

TABLE 1.7 REQUIREMENTS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

Assembly Description Being Penetrated	Required Rating		Min. Positive Pressure Differential
	F (Fire)	T (Temperature)	
Fire-Resistance-Rated Walls (IBC 712.3)	Not less than required fire-resistance rating of wall penetrated	[---]	0.01 inch water
Horizontal Assemblies (IBC 712.4)	≥ 1-Hour but not less than required rating of floor penetrated.	≥ 1-Hour but not less than required rating of floor penetrated. Exception: T-Rating not required for penetrations contained within cavity of wall.	0.01 inch water
Smoke Barriers (IBC 712.5) Air leakage rate ≤ 5.0 cfm of penetration opening at 0.30 inch water for ambient and elevated temperature tests.	[---]	[---]	[---]
Smoke Partitions: seal penetration with smoke seal sealant or compound.	[---]	[---]	[---]

1.8 DEFERRED SUBMITTAL

A. See definition of Deferred Submittal under Section 01 42 00.

B. Submit under the provisions of Section 01 33 00.

C. Coordinated Submittal: All trades who penetrate fire-rated construction assemblies shall be responsible for installation of penetration firestopping systems in accordance with a Bidder-Designed single unified Submittal as follows:

1. Product Data: Provide product characteristics, performance, limitation criteria and testing approvals to indicate compliance with Project requirements.
   a. Provide firestopping systems from Owner's approved list of systems, unless otherwise indicated, or required. Obtain list from Contracting Officer.
2. Penetration details: Provide manufacturer's installation instructions and details.
3. Matrix: Provide matrix describing penetration firestopping systems as follows. Do not use more than one product for similar applications.
   a. Acceptable Matrix Format: See sample Matrix at end of this Section.
   b. Verify and state on Matrix that "there are no penetrations requiring a 2F / 2T rating."
4. Approvals: The Architect will review Submittal for completeness and will verify that proposed through-penetration protection systems are appropriate. Provided the Submittal is complete and satisfactory, submit to Building Official under the provisions of Section 01 36 00. Distribute copies of approved Submittal to all trades whose Work penetrates fire-rated walls and floors.
   a. Engineered equivalents may be required for 2T designs for non-combustible pipe penetrations. In that case, provide manufacturer's

engineered design(s) with appropriate documentation for Building Official approval.

D. Architect may review and approve products but approval may also be required by Building Official. It is responsibility of manufacturer or vendor to obtain Building Official approval.

E. It shall be the sole responsibility of the General Contractor to verify the following to the satisfaction of the Contracting Officer and in such format acceptable to same:
   1. Firestopping Work has been installed and installed properly.
   2. Firestopping Work has been installed where required and labeled correctly.

1.9 FIELD QUALITY CONTROL SUBMITTALS (When required by Contracting Officer)

A. For verification purposes, after completion of installation by Trade, submit to Contracting Officer Shop Drawings and Photographic Record of all penetration firestopping installed by each Trade as specified.

B. Shop Drawings: Size shall be not less than 24 x 36 inches. Indicate the following:
   1. Submit separate Floor Plan Shop Drawing prepared by each Trade for each floor level.
   2. Include complete limits of Work from point of connection to existing utility in building to point of rough-in for new Work.
   3. Clearly indicate all fire-rated assemblies to be penetrated.
   4. Fire ratings of all fire-rated assemblies.
   5. Indicate utility to be installed; ie: medical gas piping, electrical conduit, sanitary waste piping, domestic water piping, etc.
   6. Clearly identify location of each photograph.

C. Photographic Record:
   1. All photographs shall be in color. Photograph each penetration through every fire-rated construction assembly, whether vertical or horizontal, after firestopping system has been installed and properly labeled.
   2. Submit to Contacting Officer a photographic record by each Trade accompanied by associated Shop Drawing. Assign a unique identification mark to each photograph.

D. Photographic Records and Shop Drawings shall be submitted in Portable Document Format (PDF).

E. Maintain Shop Drawings and Photographic Record current as work progresses. Allow Architect or Contracting Officer to view records when requested.

1.10 CLOSEOUT SUBMITTALS

A. Submit under the provisions of Sections 01 77 00 and 01 78 23.

B. Matrix: Provide matrix describing penetration firestopping systems from approved Submittal.

C. Product Data: Provide product data sheets from approved Submittal.

D. MSDS Sheets: Provide Material Safety Data Sheets for products installed.

E. Warranty.

1.11 PRODUCT DELIVERY, STORAGE & HANDLING

A. Deliver material in the manufacturers' original, unopened containers or packages with manufacturer's name, product identification, lot numbers, UL labels and mixing and installation instructions, as applicable.

B. All protection system materials shall be installed prior to expiration of shelf life.

1.12 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity.
   1. Conform to ventilation and safety requirements.

B. Sequence Work to permit protection system materials to be installed and inspected prior to cover or being made inaccessible by subsequent construction.

C. Where protection system materials are installed at locations which will remain exposed in the finished Work, select materials appropriate for the application or provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.
   1. Install protection system prior to painting so that the installation can be inspected and approved prior to painting.

1.13 WARRANTY

A. Warranty agreeing to repair or replace firestopping which fails in joint adhesion, co-adhesion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability, or appears to deteriorate in any other manner not clearly specified by submitted manufacturer's product data as an inherent quality of the material for the exposure indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to Project requirements, provide products from the following:
   1. 3M, www.3m.com.
   2. No Substitutions.

2.2 MATERIALS

A. General: Products shall meet the specified requirements. Products of more than one manufacturer may be provided in the Work, but the products to be used in any one assembly or penetration shall be by one manufacturer.
B. Accessory Materials: Provide all ceramic blankets, non-combustible insulation and primer as required by test data to complete system installation.
C. Duct Penetrations: Annular spaces around ducts, where they penetrate fire-rated and/or smoke assemblies but are not equipped with fire dampers, shall be sealed against smoke penetration, as recommended by manufacturer and as approved by Building Official.
D. Tops of Rated Partitions: Seal with a combination of non-combustible insulation packing and fire-rated elastomeric caulking, mastic or spray. Joint sealant selected shall be capable of movement. Coordinate with type of deflection track used.
E. Slab Perimeters at Exterior Walls: Seal with a combination of non-combustible insulation packing and fire-rated elastomeric caulking, mastic or spray. The joint system shall be approved for slab perimeters as a 2-hour firestop and smoke barrier for joint widths shown.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material or other matter which may affect bond of firestopping material.
B. Remove incompatible materials which affect bond.
C. Install backing materials to arrest liquid material leakage.
D. Install masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

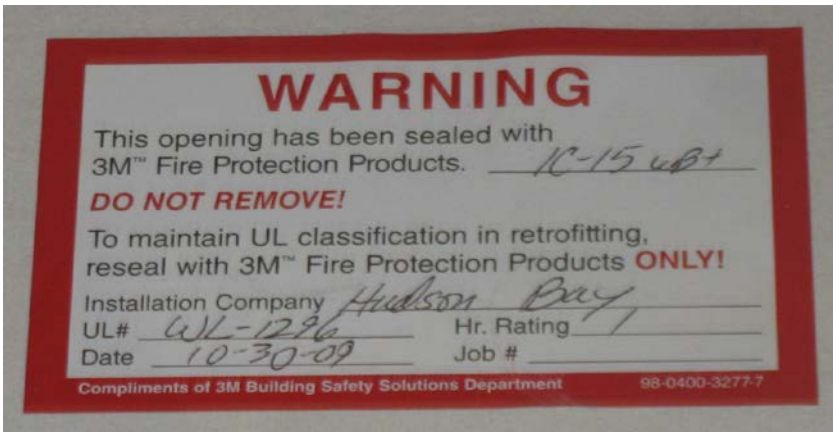
3.2 APPLICATION

A. Installation shall be performed in strict accordance with approved Submittal Details.
B. Coordinate plumbing, mechanical, electrical and other Work to assure that all pipe, conduit, ducts, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of penetration seals. Schedule and sequence the Work to assure that partitions, ceilings and other construction which would conceal penetrations are not erected prior to the installation of penetration seals.

C. Install non-combustible dams when required to properly contain protection materials within openings and as required to achieve required fire-resistance rating.
D. Finish surfaces of protection systems materials which are to remain exposed in the completed Work to a uniform and level condition.
E. Correct installations unacceptable to Building Official and provide additional protective measures as required to pass inspection.

3.3 CLEANING
A. Remove spilled and excess materials adjacent to penetrations without damaging adjacent surfaces.
B. Leave finished Work in neat, clean condition with no evidence of spill overs or damage to adjacent surfaces.

3.4 IDENTIFICATION OF PENETRATION FIRESTOPPING SYSTEMS
A. Provide permanent identification label adjacent each penetration through a fire-rated construction assembly that is sealed with an UL-approved penetration firestopping system.
B. Label shall list the UL-assembly type actually installed.
C. Place label near the actual penetration within clear view.



Sample Product/UL Assembly Identification Label

END OF SECTION

PENETRATING ITEM	ASSEMBLY	Fire Rating (hours)		SYSTEM	PRODUCT
		F (Fire)	T (Temp)		
Metallic Pipe, up to 2" annular	Concrete Walls & Floor	1, 2, & 3	1, 2, & 3	C-AJ-1427	CP25WB+, FB3000WT
Metallic Pipe, coupling in wall	Gypsum Board	1 & 2	1 & 2	WL-1426	CP25WR+
Insulated Pipe	Concrete Wall & Floors	1 & 2	1 & 2	C-AJ-5210	CP25WB+, FB3000WT
Insulated Pipe	Gypsum Board	1 & 2	1 & 2	WL 5168	CP25WB+

Note to Design-Build Preparer of Matrix: Meet the requirements of Section 07 84 13, Sub-subparagraph 1.8 C3.b

SAMPLE DOCUMENT TO ILLUSTRATE ACCEPTABLE FORMAT

SECTION 07 84 13 PENETRTATION FIRESTOPPING MATRIX

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SECTION 07 92 00 JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Exterior silicone sealants.
- B. Interior silicone sealants.
- C. Interior acrylic latex sealants.
- D. Polyurethane sealants.
- E. Butyl rubber sealants.
- F. Sealant backing materials.
- G. Sand for sealant joints in exterior masonry construction.
- H. Work of this Section is affected by sustainable design reporting requirements.
- I. Where Required:
  1. Except as otherwise indicated, seal all exterior joints to make entire building envelope weatherproof.
  2. Pre-compressed foam seismic joint seals in exterior walls.
  3. In addition, seal joints on interior of building as shown or indicated.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 - SUBMITTAL PROCEDURES: Product data and samples.
- C. Section 01 33 29 – SUSTAINABLE DESIGN REPORTING: for applicable reporting requirements and forms.
- D. Section 01 81 14 – Volatile Organic Compound (VOC) Limits: for acceptable VOC limits.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Preformed joint filler for concrete walks, sealing of control joints on interior slab on grade.
- F. Section 07 51 13 – BUILT-UP ASPHALT ROOFING: for mastic sealant for use in roofing application.
- G. Section 06 40 00 - ARCHITECTURAL WOODWORK: Sealing countertops.
- H. Section 07 84 13 - PENETRATION FIRESTOPPING: Sealing of sleeves in fire-rated floors and walls for mechanical and electrical penetrations
- I. Section 08 51 00 - ALUMINUM WINDOW WALLS: Sealing of window wall.
- J. Section 08 63 00 - METAL-FRAMED SKYLIGHTS: Sealing of skylights.
- K. Section 08 80 00 - GLAZING: Glass-to-glass or metal-to-glass sealants.
- L. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: Acoustical sealants.
- M. Section 09 30 00 - CERAMIC TILE: Sealing joints in ceramic tile.
- N. Division 22 - PLUMBING: Sealing surrounds of plumbing fixtures.

1.3 REFERENCES
- A. Reference Standards shall be latest published edition at date of Bid.
- B. ASTM International (ASTM):
  1. ASTM C510, Standard Test Method for Staining and Color Change of Single and Multi-Component Joint Sealants.
  2. ASTM C719, Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
  3. ASTM C794, Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
  4. ASTM C834, Standard Specification for Latex Sealants.
  5. ASTM C920, Standard Specification for Elastomeric Joint Sealants.
  6. ASTM C1087, Standard Test Method for Determining Compatibility of Liquid-Applied Sealants With Accessories Used in Structural Glazing Systems.
  7. ASTM C1184, Standard Specification for Structural Silicone Sealants.
  8. ASTM C1193, Standard Guide for Use of Joint Sealants.
  9. ASTM C1248, Standard Test Method for Staining Porous Substrate by Joint Sealants.
  10. ASTM C1330, Cylindrical Sealant Backing for Use With Cold Liquid-Applied Sealants.
  11. ASTM D2203, Standard Test Method for Staining From Sealants.

C. Federal Specifications (FS):
   1. FS TT-C-1796A, Caulking Compounds, Metal Seam and Wood Seam.
   2. FS TT-S-001657, Sealing Compound-Single Component, Butyl Rubber Based, Solvent Release Type (for Buildings and Other Types of Construction).
D. National Sanitation Foundation (NSF):
   1. NSF/ANSI Standard 51, Food Equipment Materials.
E. Sealant Waterproofing & Restoration Institute (SWRI):
   1. SWRI Sealant and Caulking Guide Specification.

1.4 DEFINITIONS
A. Adhesive Failure: Failure of sealant illustrated by the adhesive pulling away clean from the substrate. Sealants are considered to have acceptable adhesion if they exhibit cohesive failure when tested.
B. Caulking: A verb used to describe the process of sealing up a construction joint.
C. Cohesive Failure: Refers to failure within the sealant itself. The sealant fails leaving behind sealant on the substrate.
D. Elastomeric: A term referring to the ability of a material to elongate when stress is applied and to return to original shape when the stress is removed. An elastomeric material is commonly referred to as a material that has memory.
E. Sealant: A term referring to elastomeric material used to fill and seal an expansion joint to prevent passage of water and allow for horizontal and lateral movement at the expansion joint.
F. Sealant Grades per ASTM C920:
   1. NS Non-sag or gunnable, for vertical applications.
   2. P Pourable or self-leveling, for horizontal applications.
G. Sealant Types per ASTM C920:
   1. M Multi-Component.
   2. S Single Component.
H. Sealant Classes per ASTM C920: 12.5, 25, 35, 50, and 100/50 (extension/compression) representing movement capability expressed in percent of joint width.
I. Sealant Uses per ASTM C920:
   1. A Aluminum.
   2. I Immersion.
   3. G Glass.
   4. M Mortar.
   5. NT Non-traffic, for horizontal and vertical applications.
   6. O Other, includes such materials as color anodized aluminum, metals other than aluminum, painted surfaces, brick, stone, tile, and woods.
   7. T Traffic, pedestrian and vehicular areas such as walkways, plazas, decks and parking garages.

1.5 QUALITY ASSURANCE
A. General Performance: Except as otherwise indicated, joint sealants are required to establish and maintain waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealants to comply with this requirement will be recognized as failures of materials and workmanship.
B. Source Limitations: Provide all products for each sealant system from one manufacturer and from single source for entire Project.
   1. Provide products from single manufacturer to ensure material compatibility where different sealant materials come in direct contact with each other.
   2. Provide each sealant system as complete unit, including accessory items necessary for proper function.

1.6 PRE-CONSTRUCTION TESTING

A. Prior to application of sealants, test each application condition to ensure sealant satisfactorily adheres to substrate.

B. Laboratory Pre-Construction Testing: Before starting Work of this Section, test sealants, joint accessories, and joint substrates in accordance with the following:
   1. Obtain samples of joint substrate products specified in other Sections.
   2. Adhesion: ASTM C794 and ASTM C719; determine surface preparation and required primer.
   3. Compatibility: ASTM C1087; determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant color.
   4. Staining: ASTM C510, ASTM C1248, or ASTM D2203; determine sealants will not stain joint substrates.
   5. Pre-construction testing will not be required if sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of Work for this Project.

C. Field Pre-Construction Testing: Before starting Work of this Section, test each sealant and joint substrate in accordance with the following:
   1. Install sealants in field samples using joint preparation methods determined by laboratory pre-construction testing.
   2. Install field test joints in inconspicuous location as selected by Architect.
   3. Minimum Test Length: 6 feet.
   4. Test Method: Apply sealant to sample substrate and perform hand-pull tab test in accordance with manufacturer's instructions and ASTM C1193, Method A.
   5. Determine if primer is required. If so, re-test using primer.
   6. Submit Test Report to Architect, under provisions of Section 01 33 00, with description of test, photographs, test results, and recommended installation procedures to obtain optimum adhesion of joint sealants to joint substrates.

D. Do not use joint preparation methods or sealant products that produce less than satisfactory adhesion to joint substrates during testing.

E. Standard of Acceptance:
   1. Joints installed during pre-construction field adhesion testing that are accepted by Architect shall be retained as Quality Standard of acceptability and incorporated into the Work of that area during general installation.
   2. At least one such accepted Quality Standard of not less than 5 feet in length shall be established for each type of sealant and substrate.

1.7 SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data:
   1. Submit manufacturer's product specifications, handling, installation, and curing instructions, and performance tested data sheets for each elastomeric product required.
   2. Manufacturer's published procedures for installation and field quality control testing.

C. Samples: Submit the following in duplicate:
   1. Manufacturer's standard color chips for Architect's color selection or verification.
   2. Upon Architect's preliminary color selection of pre-compressed seismic joint seal, submit actual samples of selected color(s).
   3. Sand for Sealant Joints in Masonry: Submit samples of sand together with sample(s) of selected mortar color(s) provided under the requirements of Division 04.

D. Pre-Construction test data and test results.

E. Prior to Substantial Completion, submit final Field Adhesion Test Log specified in Article 3.6 of this Section.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
   2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F.
   3. When joint substrates are damp or rain is anticipated within 12 hours after application.
   4. Don not install silicone sealants during inclement weather or when such conditions are expected.
   5. Installation in cold weather: If job progress or any other condition requires installation of joint sealants in temperature that is below the minimum as stated in the manufacturer's printed literature, consult the manufacturer's representative and establish the minimum provisions required to ensure satisfactory Work. Record in writing, to the manufacturer with copy to the Architect, the conditions under which such installation must proceed, and the provisions made to ensure satisfactory Work.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joints widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates. Install joint sealants in concrete joints prior to application of paint coating.

1.9 DELIVERY, STORAGE &HANDLING

A. Deliver materials to Project Site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent deterioration or damage due to moisture, high or low temperatures, contaminants or other causes.

C. Do not use sealants and primers after manufacturer’s stated shelf life.

1.10 WARRANTY

A. At Project closeout, submit for inclusion in Operation and Maintenance Manuals, written warranty signed by Installer and Contractor agreeing to repair or replace joint sealants which have failed to provide watertight joints for any reason, or which appear to have failed in adhesion, cohesion, abrasion resistance, stain resistance or any other form of apparent deterioration (excluding limitations clearly specified in the manufacturer's product data). All repair or replacement Work shall comply with requirements of the Contract Documents.

B. Warranty Period: 5 years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANT MATERIALS – GENERAL

A. Prohibited Chemical Formulations:
   1. Products for Interior Use: Joint sealants containing mercury, butyl rubber, neoprene, SBR, or nitrile not allowed.
   2. Joint sealants formulated with aromatic solvents (organic solvent with benzene ring in its molecular structure), fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, or their components not allowed.

B. Manufacturers: Subject to requirements, acceptable manufacturers and products are as specified for each Sealant Type.

C. VOC Content of Interior Sealants: Meet requirements of Section 01 81 14.

2.2 SEALANT TYPE AL – ACRYLIC LATEX

A. Pre-pigmented, non-sag, non-staining, non-bleeding siliconized acrylic latex sealant. Intended to receive paint finish.

B. Acceptable SWRI certified Products and Manufacturers: Subject to requirements, provide one of the following:
   1. BASF Building Systems, www.buildingsystems.basf.com: Sonolac.
   2. Pecora Corp., www.pecora.com: AC-20.
   3. Tremco Inc., www.tremco.com: Tremflex 834.

C. Compliance: Meet or exceed requirements of ASTM C834, Type OP, Grade 18 deg C.

D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 3/4 inches (19 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 3/8 inch (9 mm) maximum.

E. Color: As selected by Architect from manufacturer's standard range.

F. Shelf Life: 12 months from date of manufacture when properly stored.

G. Application Temperature Range: plus 40 deg F to plus 80 deg F.

H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.

I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.

J. Joint Movement Capability: Plus or minus 7.5 percent after 21-day cure time when tested in accordance with ASTM C719.

2.3 SEALANT TYPE BR – BUTYL RUBBER

A. One-component, pre-pigmented, chemical-cure butyl rubber sealant. For exterior use.

B. Acceptable SWRI certified Manufacturers and Products:
   3. Pecora Corp., www.pecora.com: BC-198.

C. Compliance: Meet or exceed requirements of FS TT-S-001657, Type 1.

D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 1/2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.

E. Color: As scheduled.

F. Shelf Life: 12 months from date of manufacture when properly stored.

G. Application Temperature Range: Minus 40 deg F to plus 120 deg F.

H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.

I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.

J. Joint Movement Capability: Plus or minus 5 percent after 21-day cure time when tested in accordance with ASTM C719.

2.4 SEALANT TYPE P-GP – POLYURETHANE, GENERAL PURPOSE

A. Two-component, non-traffic grade, chemical cure, non-sag, polyurethane sealant. For interior movement joints. Paintable.

B. Acceptable Manufacturers and Products: Subject to requirements, provide one of the following:
   1. Sika Corp., www.sika.com: Sikaflex-2c NS TG.
   2. Tremco Inc., www.tremco.com: Dymeric 511.

C. Compliance: Meet or exceed requirements of ASTM C920, Type M, Grade NS, Class 25, Uses NT, G, M, A, and O.

D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 1 inch (25 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.

E. Color: As selected by Architect from manufacturer's standard range.

F. Shelf Life: 12 months from date of manufacture when properly stored.

G. Application Temperature Range: Plus 40 deg F to plus 100 deg F.

H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.

I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.

J. Joint Movement Capability: Plus or minus 25 percent after 21-day cure time when tested in accordance with ASTM C719.

2.5 SEALANT TYPE P-TG – POLYURETHANE, TRAFFIC GRADE

A. Multi-component, traffic grade, non-sag, chemical curing, pre-pigmented, polyurethane sealant.
B. Acceptable SWRI certified Products and Manufacturers:
   1. BASF Building Systems, www.buildingsystems.basf.com: Sonolastic NP2.
   2. Pecora Corp., www.pecora.com: DynaTred.
   3. Tremco Inc., www.tremco.com: Vulken 227.
C. Compliance: Meet or exceed requirements of ASTM C920, Type M, Grade NS, Class 25, Uses T, M, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: As selected by Architect from manufacturer's standard range.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Minus 20 deg F to plus 122 deg F.
H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus or minus 25 percent after 21-day cure time when tested in accordance with ASTM C719.

2.6 SEALANT TYPE S-DM – SILICONE, DYNAMIC MOVEMENT WEATHERSEAL
A. Elastomeric, ultra-low-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant. For joints subject to dynamic movement and low-tensile strength substrates such as EIFS.
B. Acceptable SWRI certified Manufacturers and Products: Subject to requirements, provide one of the following:
   1. Dow Corning, www.dowcorning.com: 790.
   3. Pecora Corp., www.pecora.com: 890.
   4. Tremco Inc., www.tremco.com: Spectrum 1.
C. Compliance: Meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 100/50, Uses NT, G, M, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: As selected by Architect from manufacturer's standard range.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Minus 20 deg F to plus 120 deg F.
H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus 100 percent or minus 50 percent after 21-day cure time when tested in accordance with ASTM C719.

2.7 SEALANT TYPE S-GP – SILICONE, GENERAL PURPOSE WEATHERSEAL
A. Elastomeric, medium-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant for general use.
B. Acceptable SWRI certified Products and Manufacturers: Subject to requirements, provide one of the following:
   1. Dow Corning, www.dowcorning.com: 756 SMS, 795.
   2. Pecora Corp., www.pecora.com: 895NST.
   3. Tremco Inc., www.tremco.com: Spectrem 2.
C. Compliance: Meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 50, Uses NT, G, M, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: As selected by Architect from manufacturer's standard range.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Minus 20 deg F to plus 122 deg F.

H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus or minus 50 percent after 21-day cure time when tested in accordance with ASTM C719.

2.8 SEALANT TYPE S-ST –SILICONE, STRUCTURAL

A. Medium-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant. For use where attraction to dirt and atmospheric contaminants is not desirable.
B. Acceptable SWRI certified Manufacturers and Products:
   1. Dow Corning, www.dowcorning.com: 795.
C. Compliance: Meet or exceed requirements of ASTM C1184 and ASTM C920, Type S, Grade NS, Class 50, Uses NT, G, M, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: As selected by Architect from manufacturer's standard range.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Minus 20 deg F to plus 120 deg F.
H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus or minus 50 percent after 21-day cure time when tested in accordance with ASTM C719.

2.9 SEALANT TYPE SR-S –SILICONE RUBBER, SANITARY

A. Medium-modulus, one-component, mildew-resistant, pre-pigmented, neutral-cure elastomeric silicone rubber sealant. Not intended for use on joints exceeding 1/2-inch.
B. Acceptable SWRI certified Manufacturers and Products:
   1. Dow Corning, www.dowcorning.com: 786.
   2. Momentive Performance Materials, www.momentive.com: GE Sanitary SCS1700 series.
   3. Pecora Corp., www.pecora.com: 898.
   4. Tremco Inc., www.tremco.com: Tremsil 200.
C. Compliance: Meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 1/2 inches (51 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: White or Translucent as scheduled.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Minus 20 deg F to plus 120 deg F.
H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus or minus 25 percent after 21-day cure time when tested in accordance with ASTM C719.

2.10 SEALANT TYPE S-TG – SILICONE, TRAFFIC GRADE

A. Ultra-low-modulus, one-component, pre-pigmented, neutral-cure, silicone sealant.
B. Acceptable SWRI certified Products and Manufacturers:
   1. Dow Corning, www.dowcorning.com: SL Parking Structure Sealant.
   2. Pecora Corp., www.pecora.com: 300 SL.
   3. Tremco Incorporated, www.tremco.com: Spectrem 800/900.
C. Compliance: Meet or exceed requirements of ASTM C920, Type S, Grade SL, Class 100, Uses NT, G, A, and O.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 1 inches (25 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 1/2 inch (13 mm) maximum.
E. Color: Gray.

F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Plus 60 deg F to 85 deg F.
H. Curing Time: 7 to 14 days at 77 Deg F and 50 percent relative humidity.
I. Full Adhesion Time: 21 days at 77 Deg F and 50 percent relative humidity.
J. Joint Movement Capability: Plus 100 percent to minus 50 percent after 21-day cure time when tested in accordance with ASTM C719.

2.11 SEALANT BACKING

A. Provide primary backing material complying with ASTM C1330 as recommended by sealant manufacturer for specific application. Use one of the following. Size: Greater than joint opening by not less than 25 percent.
B. Pre-compressed Joint Seal:
1. Open-cell, flexible foam strip or polyurethane or other weather-resistant material, saturated with butylenes or other non-drying liquid sealant/adhesive, to a formulation which will form a paintable watertight joint at 50 percent compression, without staining, migrating, hardening, or other performance failure.
2. For use a secondary seal behind primary wet sealant and as seismic joint material.
3. Subject to requirements, provide one of the following:
a. Emseal Joint Systems, Ltd., www.emseal.com: Backerseal (Greyflex). Width: as required for joint width.
b. Willseal USA, www.willsealusa.com: Willseal.

2.12 MISCELLANEOUS MATERIALS

A. Joint Primer / Sealer: Provide type of joint primer / sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.
B. Bond Breaker Tape: Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement. Provide polyethylene or other plastic tape recommended by sealant manufacturer.
C. Masking Tape: Non-staining, non-absorbent type compatible with sealant and adjacent surfaces.
D. Sand: Clean dry sand for applying to sealant at masonry construction. Color: As selected by Architect.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer shall examine joint surfaces and conditions under which joint sealant Work is to be performed, and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with joint sealant Work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

3.2 JOINT PREPARATION

A. Clean joint surfaces and remove protective coating which might interfere with bond of joint sealants. Except for stained concrete, do not apply elastomeric sealants to joint surfaces previously treated with paint, sealer, curing compound, elastomeric coating, water repellent or other coatings unless a laboratory test for durability of bond has been successfully completed by the manufacturer.
B. Prime joint surfaces in horizontal concrete joints, except stained concrete, and where indicated, and where recommended by sealant manufacturer. Confine primer / sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
C. Joint Requirements:
1. All joints and spaces to be sealed in exterior Work shall be less than 3/8-inch deep and not less than 1/4-inch wide. If joints in masonry are less than that specified herein, the mortar shall be cut out to the required width and depth.
2. All joints and spaces to receive sealant shall be properly prepared and thoroughly dry before installation of sealant.

3. Unless otherwise specified, joints and spaces which are open to a depth of greater than 3/8-inch shall be solidly filled with backing material to within 1/4-inch of the substrate surface.
4. Installation of Backing Material: Pack backer rod tightly and continuously along entire length of joint.
5. Installation of Bond Breaker Tape: Apply where joint depth is less than 1/4-inch, too shallow for backer rod. Apply continuously along entire length of joint.
6. Install backing material so that it is no shallower than 1/4-inch from the exposed surface of the substrate(s) to be sealed.
7. Sealant joints shall meet the following width-to-depth requirements, unless otherwise recommended in writing by sealant manufacturer:

Table 3.2 – SEALANT JOINT WIDTH-TO-DEPTH RATIO REQUIREMENTS		
	Sealant Depth (inches)	
Joint Width	Minimum	Maximum
1/4 inch	1/4	1/4
Greater than 1/4 inch, equal to 1/2 inch	1/4	3/8
Greater than 1/2 inch, equal to 1 inch	3/8	3/8
Greater than 1 inch, less than 2 inches	3/8	3/8

3.3 INSTALLATION

A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.
B. Set joint filler units at depth or position in joint as indicated to coordinate with other Work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
C. Install sealant backer rod for vertical sealants and where shown.
D. Install bond breaker tape where required by manufacturer's recommendations to ensure that sealants will perform as intended.
E. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt. Pour joints in horizontal surfaces flush with adjacent surfaces.
F. Install sealant to depths as shown, or if not shown, as recommended by sealant manufacturer, but within the following general limitations measured at center (thin) section of beads (not applicable to sealants in lapped joints).
    1. Fill joints to a depth equal to 50 percent of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.
G. Tool all non-sag joints to neat, uniform profiles. Recessed joints shall be tooled flat with uniform depth of recess.
H. Interior sealant joints, except traffic joints, will be painted over.
I. Spillage: Do not allow sealants or compounds to overflow from confines of joints, or to spill onto adjoining work, or to migrate into voids of exposed finishes. Mask off edges of recessed joints. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.4 INSTALLATION, PRE-COMPRESSED FOAM SEALANT

A. Install with manufacturer supplied lubricant adhesive on one side of joint in accordance with manufacturer’s printed instructions.
B. Bond ends of pre-compressed foam sealants together with adhesive or “weld” by other means and recommended by manufacturer to ensure continuous watertight and airtight performance. Miter-cut and bond ends at corners unless molded corner units are provided.

C. At exposed locations, recess joint and seal over with Type S2 sealant. Color of sealant may vary with adjacent materials.

3.5 CURE & PROTECTION

A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

B. Advise Contractor of procedures required for cure and protection of joint sealants during Construction Period, so that they will be without deterioration or damage (other than normal wear and weathering), at time of Substantial Completion.

C. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects.

D. Replace or restore sealants which are damaged or deteriorated during Construction Period.

3.6 FIELD QUALITY CONTROL

A. Field Adhesion Testing: To verify that joint sealants have been installed in accordance with the Contract Documents or manufacturer's criteria, Contractor shall, in presence of Architect and/or Contracting Officer, perform in-place adhesion tests in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.

1. Perform 5 tests for first 1,000 linear feet of applied sealant and one test for each additional 1,000 lineal feet thereafter.
2. For sealant applied between dissimilar materials, test both sides of joint.

B. Cut out test areas as directed, and if acceptable, patch areas to blend in with adjacent joints.

C. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.

D. Maintain current test log and submit report to Architect indicating tests, locations, photographs, dates, results, and remedial actions if any taken. Provide copy of report for review when requested by Architect.

E. If test results indicate that more than one-half of tests fail, entire installation may be rejected.

3.7 JOINT SEALANT SCHEDULES

TABLE 3.7A - SCHEDULE OF EXTERIOR JOINT APPLICATIONS (JA) & SEALANT PRODUCTS					
Mark	Exposure	Application	Paintable Yes/No	Sealant Color	Sealant Type
JA-1	Exterior, Non-Traffic	Wall joints bordered on both sides by porous building material, ie: concrete, stone, masonry, Exterior Insulation and Finish System (EIFS).	No	Closely match adjacent surfaces. Color as selected by Architect.	S-DM selection subject to EIFS mfr.
JA-2	Exterior, Non-Traffic	Wall joints bordered on both sides by non-porous building material, ie: coated and non-coated metals, anodized aluminum, glass.	No	Closely match mortar. Color as selected by Architect. Sand finished joint.	S-GP
JA-3	Exterior, Non-Traffic	Wall joints bordered on one side by porous building and other side by non-porous building material.	No	Closely match mortar. Color as selected by Architect. Sand finished joint.	S-GP
JA-4	Exterior, Non-Traffic	Exterior perimeter penetrations through walls.	No	Closely match adjacent surfaces. Color as selected by Architect.	S-GP
JA-5	Exterior, Non-Traffic	Control joints and perimeter penetrations in soffits and overhead surfaces.	No	Closely match adjacent surfaces. Color as selected by Architect.	S-GP
JA-6	Exterior, Non-Traffic	Perimeter joints between wall materials listed above in JA-1 and JA-2 and frames and their rough openings.	No	Closely match adjacent surfaces. Color as selected by Architect.	S-GP selection subject to EIFS mfr.
JA-7	Exterior, Non-Traffic	Wall and soffit joints between frames and adjoining surfaces.	Yes	Closely match adjacent surfaces. Color as selected by Architect.	S-GP
JA-8	Exterior, Non-Traffic	Concealed bedding under metal thresholds and saddles.	No	Manufacturer's standard	BR
JA-9	Exterior, Non-Traffic	Mastic sealant for roofing. As specified in section 07 51 13.	[---]	[---]	[---]

TABLE 3.7B - SCHEDULE OF INTERIOR JOINT APPLICATIONS (JA) & SEALANT PRODUCTS					
Mark	Exposure	Application	Paintable Yes/No	Sealant Color	Sealant Type
JA-21	Interior, Non-Traffic	Wall and ceiling joints not subject to movement.	Yes	Closely match adjacent surfaces. Color as selected by Architect.	AL
JA-22	Interior, Non-Traffic	Joints at dissimilar materials, not subject to movement.	Yes	Closely match adjacent surfaces. Color as selected by Architect.	AL
JA-23	Interior, Non-Traffic	Wall and ceiling joints subject to movement.	Yes	White	P-GP
JA-24	Interior, Non-Traffic	Joints at dissimilar materials, subject to movement.	Yes	White	P-GP
JA-25	Interior, Non-Traffic	Perimeter joints of exterior openings.	Yes	Closely match adjacent surfaces. Color as selected by Architect.	P-GP
JA-26	Interior, Non-Traffic	Wall and ceiling joints between frames and their rough openings.	Yes	White.	AL
JA-27	Interior, Non-Traffic	Wall and ceiling joints between frames and adjoining surfaces.	Yes	Closely match adjacent surfaces. Color as selected by Architect.	AL
JA-28	Interior, Non-Traffic	Horizontal control, expansion and contraction joints in ceramic tile.	No	Translucent	SR-S
JA-29	Interior, Non-Traffic	Vertical control, expansion and contraction joints in ceramic tile. Joints where non-planar tile surfaces meet. Joints between shower receptors and ceramic tile.	No.	Translucent	SR-S
JA-30	Interior, Sanitary, Non-Traffic	Joints between plumbing fixtures and adjoining floor, wall and ceiling surfaces.	No	White	SR-S
JA-31	Interior, Non-Traffic	Joints between plumbing fixtures, sinks and lavatories and adjacent countertops. Joints between backsplashes and wall substrates and backsplashes and countertops.	No	Translucent	SR-S
JA-32	Interior, Non-Traffic	Concealed behind escutcheon plates at valve pipe penetrations and showerheads in showers.	No	White	SR-S
JA-33	Interior, Traffic	Floor Joints	No	Closely match adjacent surfaces. Color as selected by Architect.	P-TG

Note1: Sealant for laboratory countertops shall be as recommended by countertop manufacturer.
Note 2: Provide UL-approved sealants for penetrations through fire-rated construction assemblies as specified in section 07 84 13.

END OF SECTION

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FIELD ADHESION TEST LOG
Testing per ASTM C1193

Project:

Sealant:

Sealant Lot Number and Color:

Primer (if applicable):

Date Applied	Applied by (initials)	Test Date	Test Location (Elevation, etc.)	Primed (Y/N)	Acceptable Adhesion (Y/N) and % Elongation	Acceptable Joint Fill (Y/N) (Measured)

DIVISION 08 – OPENINGS

08 38 00 TRAFFIC DOORS (FLEXIBLE PVC IMPACT TRAFFIC DOORS)

A. Section Includes: Recommended jamb is ¼" thick and 4" wide minimum steel frame.

B. Submittals:
1. Product data: Submit manufacturer's data indicating products provided.
2. Shop Drawings: Show fabrication and installation details; include door elevations, head, jamb, and meeting stile details including full or partial gaskets.

C. Delivery, Storage and Handling
1. Store products in the manufacturer's unopened packaging until ready for installation.
2. Acceptance at sight: Inspect work upon delivery of damage; rejecting any damaged items.

D. Warranty
1. Manufacturer's standard one-year warranty that products are free of defects in material and workmanship, guaranteeing to replace (exclusive of freight and labor) parts proven defective within one year after the date of shipment to purchaser. The stainless-steel hardware has a lifetime warranty against corrosion.

E. Products
a) Acceptable Manufacturers: Curtron Products, 5350 Campbells Run Road, Pittsburgh, PA 15205

F. Substitutions: Discuss with architect/owner if substitution required.

G. Materials:
1. Door Type: Polar-Pro Flexible Traffic Doors
2. Traffic Type: Retail/ cart traffic, light duty.
3. Sizes: 17" to 60" wide; up to 108" high
4. 4. Panels: Constructed of 1 ply of .080" thick smooth clear PVC with a 3" overlap at leading edge; Standard (0°-150°F) or Low Temp (-20°-140°F) panels
5. available. 3" high anti curl strip to prevent cupping.
6. Panel Options: Option: .120" Thick smooth clear PVC Standard (0°-150°F) or Low Temp (-20°-140°F) available. Consult manufacturer for available colors.
   24" high vision panel for colored doors.
7. Hardware: Stainless Steel (400C/300), fully adjustable hinges swing open and closed on an even plane. Hinges are fully adjustable for jamb alignment and
   Closing speed of each panel. Hinges also include a metal air lock seal to seal the hinge area. 300 Series Stainless steel door leafs. Universal hardware mounts
   in-jamb or on the wall.

H. Execution
1. Examination:
   a. Do not begin installation until substrates have been properly prepared.
   b. Verify that jambs are plumb and square.
   c. Substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
   d. Submit copy of installer's report to Architect of record within 72 hours of report receipt.

2. Preparation
   a. Clean surfaces thoroughly before installation.
   b. Prepare surfaces using the methods recommended by the manufacturer for achieving the best results for substrate under the project conditions.

3. Installation
   a. Install in accordance with the manufacturer's instructions.
   b. Minimum jamb construction of double studded 2" by 4" wood or equivalent.
   c. Reinforce hollow metal jambs at hardware locations.

4. Protection
   a. Protect installed products until completion of the project.
   b. Touch-up, repair or replace damaged products before substantial completion

08 71 00 – DOOR HARDWARE

A. Section Includes: The complete hardware requirements for the project. Quantities listed are for the contractor's convenience only and are not guaranteed. Items not specifically mentioned, but necessary to complete the work shall be furnished, matching the items specified in quality and finish.

B. Related Sections:
   1. Section 08 Hollow Metal Doors and Frames
   2. Section 08 Wood Doors
   3. Section 08 Aluminum Entrances and Storefronts
   4. Section 26 Electrical
   5. Section 28 Electronic Security and Safety

C. Quality Assurance
   1. Product Qualification:
      a. To assure a uniform high quality of materials for the project, it is intended that only specified items be furnished.
      b. Hardware to be new, free of defects, blemishes and excessive play. Obtain each kind of hardware (Mechanical latch and locksets, exit devices, hinges and closers) from one manufacturer except where specified.
      c. Fire-Rated opening in compliance with NFPA80. Hardware UL10C/UBC-7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved bearing hinges and smoke seal. Furnish openings complete.

   2. Supplier Qualifications:
      a. Hardware supplier will be a direct factory contract supplier who employs a certified Architectural Hardware Consultant (AHC) available at all reasonable times during the work for project hardware consultation to the owner, architect and contractor.
      b. Supplier will be responsible for detailing, scheduling and ordering of finish hardware.
      c. Conduct pre-installation conference at jobsite. Initiate and conduct with supplier, installer and related trades. Coordinate materials and techniques and sequence complex hardware items and systems installation.
      d. Key Conference shall be initiated and conducted with owner to determine system, keyway(s) and structure.

D. Installer Qualifications:
   1. Installer to have not less than 3 years' experience specializing in installation of work in this section. The company must maintain qualified personnel trained and experienced in installing hardware.

E. References
   1. IBC – International Building Code
   2. NFPA80 – Fire Doors and Windows
   3. NFPA101 – Life Safety Code
   4. NFPA105 – Smoke and Draft Control Door Assemblies
   5. ANSI A117.1 - Accessible and Usable Buildings and Facilities
   6. BHMA – Builders Hardware Manufacturers Association
   7. DHI – Door Hardware Institute

F. Submittals
   1. Hardware schedule: Submit digital copies of schedule. Organize vertically formatted schedule into Hardware Sets with index of doors and headings, indicate complete designations of every item required for each door or opening. Include the following:
      a. Type, style, function, size, quantity and finish of hardware items.
      b. Name, part number and manufacture of each item.
      c. Fastenings and other pertinent information.
      d. Explanation of abbreviations, symbols and codes contained in schedule.
      e. Door and frame sizes, materials and degrees of swing.

2. Product Data: Submit digital copies for each product indicated.
3. Templates: Obtain and distribute templates for doors, frames, and other specified works to be prepared for installing door hardware.
4. Wiring/Riser diagrams: As required for electric hardware indicated.
5. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
6. Keying Schedule: Prepared by or under the supervision of supplier, after receipt of the approved finish hardware schedule, detailing Owner's final keying instructions for locks.
7. Samples: Upon request, submit material samples.

G. Delivery, Storage, And Handling
1. Deliver, store, handle and protect products to project site under provisions of Division 1 and as specified herein.
2. Tag each item or package separately, with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
3. Deliver keys to Owner by registered mail.

E. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   a. Warranty Period: Years from date of Substantial Completion, for durations indicated.
      i. Closers: Thirty years
      ii. Automatic Operators: Two years
      iii. Exit Devices, Electrical: Three years
      iv. Exit Devices, Mechanical: Ten years
      v. Locksets, Electrical: Three years
      vi. Locksets, Mechanical, Cylindrical: Ten years
      vii. Locksets, Mechanical, Mortise: Ten years

F. Maintenance
1. Maintenance tools:
   a. Furnish the complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

G. Products
1. Material And Fabrication
   a. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.
   b. Provide items and quantities not specifically mentioned to ensure proper and complete operational installation.

H. Manufacturers
1. Products deviating from those listed in the hardware sets must be approved through a substitution request as described in Division 01.
2. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 012500. Prior bid approval by Architect/Owner.

ITEM	SCHEDULED MANUFACTURER	ACCEPTABLE MANUFACTURER
Hinges	Ives (IVE)	No Substitution
Flush Bolts & Coordinators	Ives (IVE)	No Substitution
Locksets & Deadlocks	Schlage (SCH)	No Substitution
Aluminum Door Locks - Narrow Style	Adams Rite (ADA)	No Substitution

Exit Devices & Mullions	Von Duprin (VON)	No Substitution
Electric Strikes	Von Duprin (VON)	No Substitution
Power Supplies	Von Duprin (VON)	No Substitution
Cylinders & Keying	Best (BES)	No Substitution
Door Closers	LCN (LCN)	No Substitution
Automatic Operators	Nabco	No Substitution
Door Trim	Ives (IVE)	No Substitution
Protection Plates	Ives (IVE)	No Substitution
Overhead Stops	Glynn-Johnson (GLY)	No Substitution
Thresholds & Weatherstrip	Zero (ZER)	No Substitution

I. Hanging
   1. Conventional Hinges: Hinge open width minimum, but of sufficient throw to permit maximum door swing. Steel or stainless-steel pins:
      a. Three hinges per leaf to 7 feet, 6-inch height. Add one for each additional 30 inches in height or any fraction thereof.
      b. Provide standard-weight 4 ½ x 4 ½ for 1 ¾" thick doors up to 3'5". Provide heavy-weight 5 x 4 ½ on doors 36" and over.
      c. Exterior outswing doors to have non removable (NRP) pins.
      d. Pin tips, flat button, finish to match leaves.
      e. Interior doors over 36" – Heavy weight.
      f. Interior doors up to 36" – Standard weight.

J. Locksets, Latch Sets, Deadbolts

   1. Extra Heavy Duty Cylindrical Locks and Latches: Schlage ND Series
      a. Provide cylindrical locks conforming to ANSI A156.2 Series 4000, Grade 1.
      b. UL listed for A label and lesser class single doors up to 4ft x 8ft.
      c. Meets A117.1 Accessibility Codes.
      d. Provide solid steel rotational stops to control excessive rotation of lever.
      e. Provide a completely refunction able lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
      f. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
      g. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
      h. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
      i. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
      j. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
         i. Lever Design: Schlage Tubular
         ii.

K. Electric Strikes
   1. Manufacturers and Products: Von Duprin 6000 Series
      a. Provide electric strikes designed for use with type of locks shown at each opening.
      b. Provide electric strikes UL Listed as burglary resistant.
      c. Where required, provide electric strikes UL Listed for fire doors and frames.
      d. Provide fail-secure type electric strikes, unless specified otherwise.
      e. Coordinate voltage and provide transformers and rectifiers for each strike as required.

L. Keys, Keying, And Key Control
   1. See Keying Requirements in this section

M. Closers
   1. Surface Closers: LCN 4040XP Series
      a. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certifies closers. Stamp units with date of manufacture code.
      b. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
      c. Cylinder Body: 1-1/2-inch (38 mm) diameter with 3/4-inch (19 mm) diameter double heat-treated pinion journal.
      d. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
      e. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
      f. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
      g. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
      h. Pressure Relief Valve (PRV) Technology: Not permitted.
      i. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117 or has special rust inhibitor (SRI).
      j. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

   2. Surface Closers: LCN 4010/4110 Series
      a. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certifies closers. Stamp units with date of manufacture code.
      b. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
      c. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
      d. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
      e. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
      f. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
      g. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
      h. Pressure Relief Valve (PRV) Technology: Not permitted.
      i. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117 or has special rust inhibitor (SRI).
      j. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

N. Other Hardware
   1. Doorstops: Provide stops to protect walls, casework or other hardware.
      a. Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.

b. Where wall or floor stops are not appropriate, provide overhead holders.

2. Weatherstrip and Gasket
   a. Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled.
   b. Provide non-corrosive fasteners as recommended by the manufacturer for application indicated.

3. Thresholds
   a. Except as otherwise indicated, provide standard metal threshold unit of type, size and profile as detailed or scheduled.

4. Silencers
   a. Hollow metal frames, 3 for single doors, 2 for pairs of doors.

5. Kickplates
   a. Four-beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

O. Hardware Finish
   1. Provide the following finishes unless noted differently in hardware groups:

Hinges	630 Stainless Steel Exterior, 652 Dull Chrome Interior
Locksets	626 Dull Chrome
Exit Devices	626 Dull Chrome
Closers	689 Aluminum
Kickplates	630 Stainless Steel
Other Hardware	626 Dull Chrome
Thresholds	Aluminum
Weatherstrip/Sweeps	Aluminum

P. Keying Requirements
   1. All keyed cylinders shall be subject to a Best Master key system, purchased/provided by Owner.
   2. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
   3. Cylinders to be furnished with visual key control with key code. Stamped on the face of the keys and marked on the back or side of the cylinders.
   4. Initiate and conduct key conference with Owner to determine correct keyway(s) and structure. Owners' written approval required prior to ordering product.
   5. Key Quantities:
      6 EA Master Keys
      4 EA Control Keys
      2 EA Construction Control Keys
      10 EA Construction Keys
      3 EA Change Keys per keyed alike group

Q. Execution:
   1. Preparation
      a. Ensure that the walls and frames are square and plumb before hardware installation.
      b. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes. Notify Architect of any code conflicts before ordering materials.

R. Installation:
   1. Do not install surface mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
   2. Locate floor stops not more than 4 inches from the wall.
   3. Drill pilot holes for fasteners in wood doors and/or frames.

S. Adjusting:
   1. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
   2. Occupancy Adjustment: Approximately three to six months after the date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

T. Demonstration:
   1. Demonstrate electrical, electronic and pneumatic hardware systems including adjustment and maintenance procedures.
   2. Protection/Cleaning
      a. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion. Clean adjacent walls, frame and door surfaces soiled from installation/reinstallation process.

U. Door Hardware Schedule:
   1. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier’s responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
   2. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
   3. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
   4. Hardware Sets: Refer to architectural drawing set for Door Hardware schedule.

08 71 13 - AUTOMATIC DOOR OPERATORS

A. Section includes automatic door operators.

B. Related Requirements:
   1. Division 26 Sections OR Electrical drawings for electrical connections including conduit and wiring for automatic entrance operators.
   2. Division 28 Sections OR Electrical drawings for connections including conduit and wiring for automatic entrance access control entrances.

C. Coordination:
   1. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.
   2. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and access-control system.

D. Submittals:
   1. Product Data: For each type of product.
      a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.
      b. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
   2. Shop Drawings: For automatic door operators.
      a. Include plans, elevations, sections, hardware mounting heights, and attachment details.
      b. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Indicate locations of activation and safety devices.
   4. Include diagrams for power, signal, and control wiring.
   5. Include plans, elevations, sections, and attachment details for guide rails, if required.
   6. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

E. Automatic Door Operators, General:
   1. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
      a. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
   2. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.
   3. Hinges: Reference Section 08 71 00 "Door Hardware" for hinge type for each door that door operator shall accommodate.
   4. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- (3.2-mm-) thick, extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.
   5. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
   6. Fire-Door Package (if required): Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. The latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.
   7. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Low Energy Power Door Operators
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. NABCO GT 400/800
      b. ASSA ABLOY; SW100 Operator.
   2. Standard: BHMA A156.19.
   3. Performance Requirements:
      a. Opening Force if Power Fails: Not more than 15 lbf (67 N) required to release latch if provided, not more than 30 lbf (133 N) required to manually set door in motion, and not more than 15 lbf (67 N) required to fully open door.

b. Entrapment-Prevention Force: Not more than 15 lbf (67 N) required to prevent stopped door from closing or opening

4. Configuration: As scheduled at end of Section.
   a. Operator to control single swinging door or pair of swinging doors.
   b. Traffic Pattern: Two way or double egress.
   c. Operator Mounting: Surface.
5. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, the door operator shall function as manual door closer, with or without electrical power.
6. Operating System: Electromechanical.
7. Microprocessor Control Unit: Solid-state controller.
8. Features:
   a. Adjustable opening and closing speed.
   b. Adjustable opening and closing force.
   c. Adjustable backcheck.
   d. Adjustable hold-open time from zero to 30 seconds.
   e. Adjustable time delay.
   f. Adjustable acceleration.
   g. Adjustable limit switch.
   h. Obstruction recycle.
   i. Automatic door re-opens if stopped while closing.
   j. On-off/hold-open switch to control electric power to operator; key operated.
9. Controls: Activation and safety devices according to BHMA standards.
   a. Activation Devices: Activate doors by the following equipment. Refer to the Door Schedule for locations.
      i. Card scanners (by others) on each side of door to activate door operator.
   b. Motion sensor mounted on ingress side of door header to detect pedestrians in activating zone and to open door.
      i. Push-plate switch Push-button switch on each side of door to activate door operator.
      ii. Access by remote switch at Nurse’s Station.
10. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.
11. Exposed Finish: Finish matching door and frame.
12. Color: As indicated by manufacturer's designations.

G. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   a. Extrusions: ASTM B 221 (ASTM B 221M).
   b. Sheet: ASTM B 209 (ASTM B 209M).
2. Expanded Aluminum Mesh: Expanded and flattened aluminum sheet according to the geometry of ASTM F 1267.
3. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

H. Controls:
1. General: Provide controls, including activation and safety devices, according to BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
2. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed in plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
   a. Provide capability for switching between bidirectional and unidirectional detection.
   b. For one-way traffic, the sensor on egress side shall not be active when doors are fully closed.
3. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.
4. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
   a. Configuration: Rectangular push plate with 2-by-4-inch (50-by-100-mm) junction box.
      i. Mounting: Recess mounted, semi flush in wall.
   b. Push-Plate Material: Stainless steel.
   c. Message: "Push to Open."
5. Key Switch: Recess-mounted, door control switch with key-controlled actuator; enclosed in 2-by-4-inch (50-by-100-mm) junction box. Provide faceplate engraved with text indicating switch functions.
   a. Faceplate Material: Stainless steel.
   b. Functions: Two-way automatic, hold open, one-way exit, and off.
   c. Mounting: Recess mounted in door jamb.

6. Wireless or Remote Radio-Control Switch: Radio-control system consisting of header-mounted receiver and wall-mounted transmitter switch. Wall-Mounted Transmitter Switch: One red-button, momentary-contact actuator enclosed in 4-by-4-inch (100-by-100-mm) junction box. Provide blue plastic cover engraved with "Press Button to Open" in white text and with international symbol of accessibility.
7. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

I. Installation:
1. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
   a. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
   b. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.
2. Controls: Install activation and safety devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
3. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

08 83 00 – MIRROR

A. Submittals
   1. Include product data.

B. Section includes:
   1. Convex Safety Mirror Units: Convex mirror on adjustable swivel mount designed to be mounted at blind corner locations where indicated on Drawings.
      a. Basis-of-Design Product: Uline; Convex Safety Mirror.
      b. Size: As indicated on the Drawings.
      c. Mounting: Wall-mounted.

C. Installation:
   1. General: Install safety mirrors according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by safety mirror manufacturer. Install units’ level, plumb, and firmly anchored in locations and at heights indicated

SECTION 09 21 16 GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gypsum board panel products.
B. Trim accessories.
C. Joint reinforcement materials.
D. Sound attenuation blankets.
E. Acoustical sealants.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
C. Section 01 50 00 - TEMPORARY FACILITIES & CONTROLS: Dust control.
D. Section 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY: Fire-retardant-treated concealed wood blocking.
E. Section 07 84 13 - PENETRATION FIRESTOPPING: Firestopping penetrations in fire-rated partitions and ceiling assemblies.
F. Division 09 – FINISHES, INTERIOR FINISH SPECIFICATION: for selected tiling.
G. Section 09 06 10 – INTERIOR FINISH SCHEDULE: for spaces scheduled to receive wall tiling.
H. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal framing to receive gypsum board.
I. Section 09 30 00 – TILING: for tile finish applied to gypsum backer board substrate.
J. DRAWINGS, PARTITION TYPES: for partition construction assemblies and fire-rated construction.
K. DRAWINGS, FLOOR PLANS: for locations of Partition Types.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. ASTM International (ASTM):
   1. ASTM C475 / C475M, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
   2. ASTM C840, Standard Specification for Application and Finishing of Gypsum Board.
   3. ASTM C1177/C1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
   4. ASTM C1396, Standard Specification for Gypsum Board.
   5. ASTM C1658, Standard Specification for Glass Mat Gypsum Panels.
   6. ASTM D3273, Standard Test Method for Resistance of Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
   7. ASTM D6329, Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
   8. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
   9. ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
   10. ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.
C. Gypsum Association (GA):
   1. GA-600, Fire Resistance Design Manual Sound Control.
D. International Code Council (ICC):
   1. International Building Code (IBC), as amended by State in which Project is located.
E. Tile Council of North America (TCNA):
   1. Handbook for Ceramic Tile Installation.

F. Underwriters Laboratory (UL)
1. UL Fire Resistance Design Directory.

1.4 REGULATORY REQUIREMENTS
A. Fire Resistance Rating: Where gypsum board Work with fire resistance ratings are indicated or required to comply with governing regulations, provide materials and installations identical with those of applicable assemblies which have been tested per ASTM E119 by fire testing laboratories acceptable to Authorities Having Jurisdiction.
1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File Numbers in GA-600 or to design designations in UL "Fire Resistance Directory" or in listing of other testing and inspecting agencies acceptable to Authorities Having Jurisdiction.

1.5 QUALITY ASSURANCE
A. Codes and Standards: Comply with provisions of following Codes, Specifications and Standards, except as otherwise indicated:
1. Codes and Standards listed under Article 1.3 of this Section.
2. Manufacturer's printed Specifications and recommendations.
B. Mold prevention is critical to Owner operations. Do not install gypsum board panels that are wet. Remove gypsum board panels that become wet after installation.
C. Provide products that offer six months of coverage against in-place exposure damage (delamination, deterioration and decay).

1.6 ACTION SUBMITTALS
A. Submit under the provisions of Section 01 33 00.
B. Product Data: Submit manufacturer's product Specifications and installation instructions for each product including other data as may be required to show compliance with these Specifications. Provide catalog cuts of accessories.

1.7 DELIVERY, STORAGE & HANDLING
A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer and supplier.
B. Store materials inside, under cover and in manner to keep them dry, protected from the weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging. Stack boards on supported floors in small stacks to avoid overloading floor construction.
C. Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.8 PROJECT CONDITIONS
A. Environmental Conditions - General: Establish and maintain environmental conditions for application and finishing of gypsum drywall to comply with ASTM C840 and with gypsum board manufacturer's recommendations.
B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment of gypsum board and finishing of gypsum board, maintain not less than 50 deg F for 48 hours prior to application and continuously after until fully dried.
C. Ventilate building spaces as required for drying joint treatment materials. Avoid conditions that result in finishing materials drying too rapidly.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Gypsum Boards:
1. For non-fire-rated and generic fire-rated assemblies, products approved by ICC-ES from any manufacturer may be used for general use.

2. Other Gypsum Board Products: As specified below.

B. For proprietary fire-rated systems and all shaft wall assemblies, provide framing and gypsum board products by same manufacturer as specified in referenced test data.

2.2 GYPSUM BOARD PRODUCTS

A. Gypsum Board for General Use:
1. Interior face layer: ASTM C1396, Type X, with tapered edges, 5/8-inch thick unless otherwise noted.
2. Approved Manufacturers: Subject to requirements, Contractor's choice.

B. Gypsum Backer Board: Coated glas-mat water-resistant, 5/8-inch thick, Type X, complying with ASTM C1178, ASTM C1288, and ASTM C1325. Subject to Project requirements, provide one of the following:
1. Dens-Shield by Georgia Pacific, www.gp.com.
2. GlasRoc Tile Backer by CertainTeed, www.certainteed.com.
3. Fiberock Aqua-Tough by United States Gypsum Co., www.usg.com.
4. No Substitutions.

C. Fire-Rated Moisture and Mold -Resistant Gypsum Board: Gypsum core panel with enhanced core formulated for resistance to moisture and mold; Type X, surfaced with moisture/mold resistant paper on front, back, and long edges. Complying with ASTM C1396. Subject to Project requirements, provide one of the following:
1. ToughRock Fireguard Mold-Guard by Georgia Pacific, www.gp.com.
2. ProRoc Moisture and Mold-Resistant with M2Tech by CertainTeed, www.certainteed.com.
3. Sheetrock Brand Mold-Tough by United States Gypsum Co., www.usg.com.
4. Approved Substitutions.

D. Gypsum Shaftliner Board: ASTM C1396, ASTM C1658, ASTM E136, Type X, 1-inch thick. Surface burning characteristics: Flame spread of 15 when tested in accordance with ASTM E84. Mold-resistance score of 10 when tested in accordance with ASTM D3273. Microbial-resistant per ASTM D6329. Subject to Project requirements, provide one of the following:
1. Dens-Glass Ultra Shaftiner by Georgia-Pacific, www.gp.com.
2. GlasRoc Shaftliner by CertainTeed, www.certainteed.com.
3. GreenGlass Liner Panels by Temple – Inland, www.templeinland.com.
4. Sheetrock Brand Glass Mat Liner Panels by USG Corp., www.usg.com.

E. Glas-Mat Gypsum Sheathing: As specified in Section 06 10 53.

F. Provide gypsum board products as scheduled below:

SCHEDULE 2.2 - USES FOR GYPSUM BOARD PRODUCTS	
Description	Where Required
Gypsum Board for General Use	At all locations not otherwise specified.
Gypsum Backer Board	Vertical surfaces behind thin-set wall tile.
Fire-Rated Moisture and Mold-Resistant Gypsum Board	Toilet room walls and ceilings scheduled to receive painted finish.
Gypsum Shaftliner Board	At all shafts and framed elevator hoistways.

2.3 TRIM ACCESSORIES

A. Accessories: Manufacturer's numbers are listed as a Basis of Design. Install in one piece when manufactured in length required.
1. Corner reinforcement: Paper faced metal outside and inside corners. Quality Standard: Styles B1 and B2 by Sheetrock Brand, www.usg.com.
2. Metal edge trim: Paper faced L-shaped tape on trim. Quality Standard: Style B4 by Sheetrock Brand, www.usg.com.
3. Control joint: Control Joint by Alabama Metal Industries Corp., www.amico-lath.com.

2.4 JOINT REINFORCEMENT MATERIALS

A. General: Except as otherwise indicated, comply with ASTM C475/C475M.
   1. Joint tape: Paper or fiberglass reinforcing tape.
   2. Joint compound: Chemical hardening type for bedding and filling. Ready-mixed vinyl-type or vinyl-type powder for topping on interior uses.

2.5 ACOUSTICAL SEALANT, CONCEALED FROM VIEW
A. Elastomeric, pre-pigmented, non-skinning, non-hardening, synthetic rubber.
   1. Acoustical sealant only for use in non-fire-rated construction assemblies where concealed from view.
B. Acceptable Manufacturers and Products: Subject to requirements, provide one of the following:
   1. OSI Sealants, www.osipro.com: SC-170.
   2. Pecora Corp., www.pecora.com: BA-98.
   3. Tremco Inc., www.tremco.com: Acoustical Sealant.
C. Compliance: Meet or exceed requirements of FS TT-C-1796A, Type I, Class A; ASTM E90.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 3/4 inches (19 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 3/8 inch (9 mm) maximum.
E. Color: Manufacturer's standard.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: plus 40 deg F (4 deg C) to plus 95 deg F (35 deg C).

2.6 ACOUSTICAL SEALANT, EXPOSED TO VIEW
A. Elastomeric, pre-pigmented, non-sag, non-flammable, non-staining, synthetic latex rubber.
   1. Acoustical sealant for use where work will be exposed to view and in fire-rated construction assemblies. Intended to receive paint finish.
B. Acceptable Manufacturers and Products: Subject to requirements, provide one of the following:
   1. OSI Sealants, www.osipro.com: SC-175.
   2. USG Corp., www.usg.com: Sheetrock Acoustical Sealant.
C. Compliance: Meet or exceed requirements of ASTM C834; ASTM E84 with flame spread 5 and smoke developed 5; ASTM E90.
D. Joint Size Limitations:
   1. Width: 1/4 inch (6.4 mm) minimum up to 3/4 inches (19 mm) maximum.
   2. Depth: 1/4 inch (6.5 mm) minimum up to 3/8 inch (9 mm) maximum.
E. Color: Manufacturer's standard.
F. Shelf Life: 12 months from date of manufacture when properly stored.
G. Application Temperature Range: Between 55 deg F and 80 deg F.

2.7 SOUND ATTENUATION BLANKETS
A. Sound Attenuation Blankets: Unfaced insulation, thickness to fill stud space. At fire-rated partition assemblies, sound attenuation products shall be of same material and manufacturer as tested assembly. At non-fire-rated construction assemblies, the following:
   1. Thermafiber SA blankets by U. S. Gypsum Co., www.usg.com.
   2. Approved Substitution.

2.8 MISCELLANEOUS MATERIALS
A. Laminating Adhesive: Meet applicable VOC requirements specified in Section 01 81 14 of type specifically recommended by gypsum board manufacturer for adhesive application.
B. Metal Control Joint: Model No. 93 by Alabama Metal Industries Corp., www.amico-lath.com.

2.8 PARTITION CLOSURES

A. Pre-assembled, spring loaded extruded aluminum assembly to provide tight fit for vertical junctures of partitions and storefront frames. Finish: anodized aluminum to match Storefront. Fill with acoustical insulation as specified in this Section.
   1. Product, Basis of Design: Mullion-Mate by Gordon Interior Specialties Div., www.gordonceilings.com.
      a. For opening widths of 2 to 4-1/2 inches: Mullion-Mate I.
      b. For openings widths of 4-1/2 to 6-1/2 inches: Mullion-Mate II.

2.9 MISCELLANEOUS MATERIALS
A. Laminating Adhesive: Meet applicable VOC requirements specified in Section 01 81 14 of type specifically recommended by gypsum board manufacturer for adhesive application.
B. Metal Control Joint: Model No. 93 by Alabama Metal Industries Corp., www.amico-lath.com.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL GYPSUM BASE INSTALLATION REQUIREMENTS
A. Erection Tolerance: Not more than 1/32-inch offsets between planes of gypsum board faces, and 1/8 inch in 8 feet for plumb, level, warp and bow.
B. Maintain 1/2-inch gap between bottom of gypsum board panels and finished floor to prevent “wicking” of moisture.
C. Install sound attenuation blankets as indicated, prior to gypsum board.
D. Install ceiling boards in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints not less than 12 inches.
E. Install gypsum board panels with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.
F. Attach gypsum board to supplementary framing and blocking forming additional support at perimeter of openings, cutouts and other locations.
G. Where acoustical sealant is indicated, apply two beads of acoustical sealant under each edge of runner tracks. Close off sound-flanking paths around or through the Work, including sealing of partitions above acoustical ceilings, and sealing around electrical boxes and other cutouts. Fill cracks totally with sealant.
H. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor / roof slabs and decks, cut gypsum board to fit profile formed by coffers, joists and other structural members. Allow for joints to install firestopping sealant on all fire-rated partitions.
I. Space fasteners in gypsum boards in accordance with referenced Standards, except on fire-rated partitions, space fasteners per referenced UL or GA test number.
J. Fasteners at Top-of-Partition Deflection Track: Attached gypsum board wall panels to framing per manufacturer recommendations. Do not attach fasteners to deflection tracks.

3.3 METHODS OF GYPSUM BOARD APPLICATION
A. Single-Layer Application:
   1. On ceilings apply gypsum board prior to wall / partition board application to the greatest extent possible.
   2. On partitions / walls apply gypsum board vertically in corridors and in large areas as required to minimize end joints. Provide sheet lengths which will minimize end joints.
   3. In small rooms, gypsum board may be installed horizontally, provided this method

eliminates vertical butt joints other than at corners.

B. On partitions / walls apply base layer and face layers vertically (parallel) with joints of base layer over supports and face layer joints offset one stud space with base layer joints.

C. Single-Layer Fastening Methods: Apply gypsum boards to metal framing with screws.

D. Double-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer with screws.

E. Laminating to Substrate: Where gypsum board panels are indicated as directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum board panels until fastening adhesive has set.

F. Laminating to Substrate: Where gypsum board panels are indicated as directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum board panels until fastening adhesive has set.

G. Curved Surfaces:
   1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12 inch long straight sections at ends of curves and tangent to them.
   2. For double-layer construction, fasten base layer to studs with screws 16 inches on center. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced at 12 inch centers.

3.4 INSTALLATION OF SHAFT WALLS

A. Provide "cavity shaft wall" as shown consisting of metal runners, studs, shaft liner, gypsum board and fasteners erected and applied in accordance with the shaft wall manufacturer's printed instructions.
   1. Provide fireproof assemblies for the hourly rating shown or required and complying with UL listing.

B. Provide temporary weather protection of shafts prior to installation of shaft liner.
   1. Wet shaft liner shall be removed and replaced at no additional cost to Owner.

C. On floor-supported walls, install shaft wall liner without screws unless specifically required by manufacturer.

D. Use full length shaft wall liner up to 14 feet in height; on higher walls locate horizontal liner joints in the top and bottom thirds of the wall and stagger the joints.

E. Provide metal stud backing for all horizontal shaft wall liner joints if required by ICC-ES approval or fire test.

3.5 INSTALLATION OF TRIM & JOINT REINFORCEMENT:

A. General: Anchor trim accessory flanges as required by mudding, screwing or stapling to substrate in accordance with manufacturer's instructions and recommendations.

B. Install corner beads at external and internal corners of gypsum board Work.

C. Install metal edge trim as shown and wherever edge of gypsum boards would otherwise be exposed or terminate at other materials. Provide type with face flanges for embedment in joint compound, except where semi-finishing type is indicated.

D. Metal Control Joints: Provided where shown and review with Architect proposed locations for all other control joints required but not shown, prior to installation.
   1. Partitions: 40 feet on center maximum where partition runs exceed 40 feet. Typically locate joint at one side of door frame and extend into ceiling. Cut gypsum board behind joint and back by double studs.
      a. Locate joints at vertical and horizontal surfaces of soffits where suspended soffits abut floor mounted partitions.
      b. Provide horizontal joints in stair walls as shown.
   2. Ceilings: Provide where shown. Cut gypsum board behind control joints and back by double framing members.
   3. Partitions: At the following locations:
      a. Where partitions abut structural elements or dissimilar walls or ceilings.
      b. 30 feet on center maximum where partition run exceeds 30 feet.

c. Typically locate joint at one side of door frame and extend into ceiling. Cut gypsum board behind joint and back by double studs.
d. Where shown.

4. Soffits: At the following locations:
   a. 50 feet on center maximum where soffit abuts a structural element, dissimilar wall or partition with perimeter relief.
   b. 30 feet on center maximum where soffit abuts a structural element, dissimilar wall or partition without perimeter relief.
   c. 30 feet on center maximum where soffit exceeds 50 feet in either direction.
   d. Where shown.
5. Suspended Partitions: Provide back-to-back metal trim where suspended soffits or partitions abut floor-mounted partitions.
6. Where resiliently-suspended gypsum board ceilings abut walls and columns, provide metal edge trim to allow ceiling to vibrate independently of walls.

E. Install joint reinforcement on gypsum board joints (including internal corners) to be covered with joint compound. Comply with manufacturer's recommendations and referenced standards for attachment and embedment of joint reinforcement in joint compound.
1. Provide mesh-type joint reinforcement, except provide paper-type where required to comply with manufacturer's recommendations for type of framing systems used or for installation procedures where rapid drying conditions exist.

3.6 INSTALLATION OF PARTITION CLOSURES
A. Verify that substrates are finished and ready to receive partition closures.
B. Install in accordance with manufacturer’s written instructions.

3.7 PENETRATIONS
A. Treat through-wall penetrations as follows:

SCHEDULE 3.7 - FINISHING OF PENETRATIONS	
Partition Type	Description
At Fire-Rated Partitions	Seal annular space of through-wall penetrations under the provisions of Section 07 84 13.
At Non-Fire-Rated Smoke Partitions	Where annular space is less than 1/2 inch: Seal annular space around penetration with flexible non-fire-rated sealant to prevent passage of smoke, both sides of partition.
	Where annular space is greater than 1/2 inch: Apply single layer of gypsum board around penetration such that remaining annular space is less than 1/2 inch. Seal remaining annular space around penetration with flexible non-fire-rated sealant to prevent passage of smoke, both sides of partition.
At All Other Partitions	Same as indicated for non-fire-rated smoke partitions.

3.8 FINISHING
A. General: Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare for decoration. Prefill open joints and rounded or beveled edges, if any, using specified type of compound.
1. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.

B. Gypsum Board Finish Levels: Finish surfaces to levels indicated below, according to ASTM C840, for locations indicated:

SCHEDULE 3.8 - GYPSUM BOARD FINISH REQUIREMENTS		
Level	Description	Where Required
1	Embed tape at joints.	Unexposed ceiling plenum areas, concealed areas and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2	Embed tape and apply separate first coat of joint compound to tape fasteners and trim flanges.	Areas to receive ceramic or stone tile set with organic adhesive.
3	Embed tape and apply separate first and finish coats of joint compound to tape, fasteners, and trim flanges. All joint compound shall be smooth and free of tool marks and ridges.	As substrate to receive high-build glazed coating. As substrate to receive heavy-grade wall coverings.
4	Embed tape and apply separate first, fill and finish coats of joint compound to tape, fasteners and trim flanges.	This is the typical finish unless otherwise indicated. At all surfaces that will be exposed to view or surfaced with thin wall coverings.
5	Embed tape and apply separate first, fill and finish coats of joint compound to tape, fasteners and trim flanges, and trowel apply skim coat of joint compound over entire surface. Finished surface shall be smooth and free of tool marks and ridges.	Surfaces to receive gloss, semi-gloss, or enamel paints. Accent color walls.

3.9 CLEAN-UP

A. Do not allow gypsum board dust and debris to accumulate on floor surfaces. Clean-up and dispose of all gypsum board scraps and dust as soon as Work of this Section is completed in any room or area.

B. Remove joint compound spillage promptly from door frames, windows and other adjoining Work.

C. Repair surfaces which have been damaged by finishing Work.

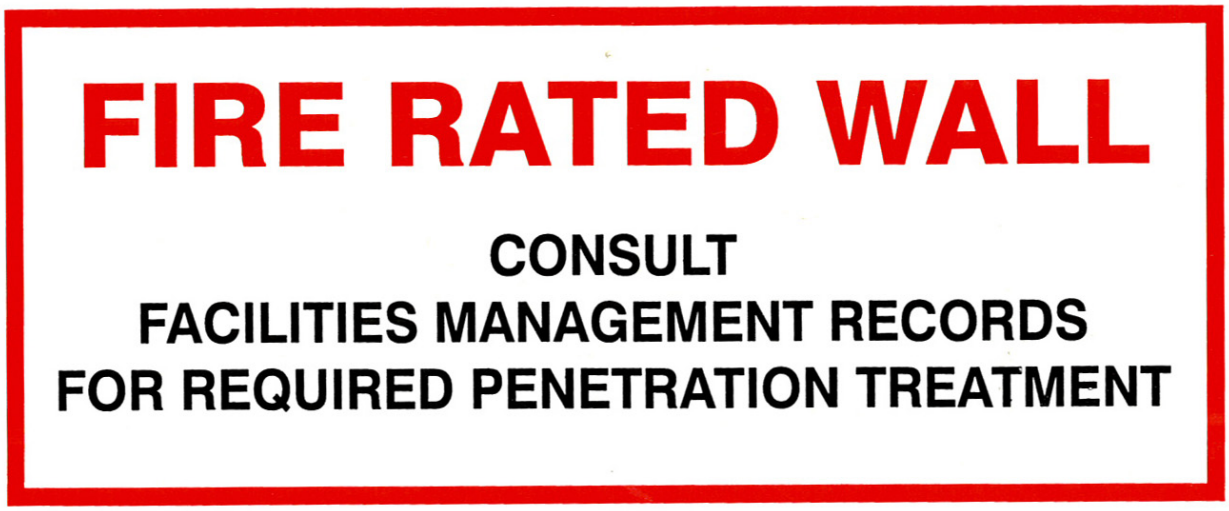
3.10 ERECTION TOLERANCES

A. Maximum Allowable Variation in the Tile Substrate: As indicated below.

SCHEDULE 3.10 - ERECTION TOLERANCES FOR TILE FINISHES		
TCNA Installation Method	Tile Size	Maximum Allowable variation
B420	Tiles with all edges shorter than 15 inches	1/4-inch in 10 feet from the required plane, with no more than 1/16-inch variation in 12 inches when measured from the high points in the surface.
	Tiles with at least one edge 15 inches in length	1/8-inch in 10 feet from the required plane, with no more than 1/16-inch variation in 24 inches when measured from the high points in the surface.
W245	All tile	1/8-inch in 10 feet from the required plane when measured from the high points in the surface.

3.11 IDENTIFICATION OF FIRE-RATED PARTITIONS

A. Provide signage as indicated below in quantity as required in accordance with the requirements of IBC Section 703.6.



B. After partitions have been painted, install identification signage on both sides of all fire-rated partitions.

1. Locate identification signage above finished ceilings and where visible by facility maintenance personnel.
2. Spacing not to exceed 15 feet centers and not less than one per fire-rated partition.

END OF SECTION

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SECTION 09 22 16 NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Non-load-bearing wall framing.

B. Concealed blocking/backing as required for attaching such items including, but not limited to; handrails, casework, door stops, toilet partitions, toilet accessories, fire protection specialties, window treatments, and ceiling tracks.

C. Supplemental framing and sub-framing as required to facilitate installation of mechanical, electrical devices and equipment.

D. Field quality control.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.

B. Section 01 33 00 - SUBMITTAL PROCEDURES: for submittal procedures.

C. Section 01 50 00 - TEMPORARY FACILITIES & CONTROLS: for dust control.

D. Section 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY: for fire-retardant-treated concealed wood blocking.

E. Section 07 84 13 - PENETRATION FIRESTOPPING: for firestopping penetrations in fire-rated partitions and ceiling assemblies.

F. Section 08 71 00 – DOOR HARDWARE: for solid blocking at all door wall stops and bumpers.

G. Section 08 71 00 – DOOR HARDWARE GROUPS: for doors scheduled to receive wall stops and bumpers.

H. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: for installation of gypsum board.

I. Section 09 22 26 – METAL SUSPENSION SYSTEMS FOR GYPSUM BOARD: for metal suspension systems for gypsum board.

J. Section 09 53 23 - METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES: for grid suspension and trim for drywall adjoining acoustical ceilings.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.

B. ASTM International (ASTM):

1. ASTM A653 / A653M, Standard Specification for Steel Sheet , Zinc-Coated (Galvanized) Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B117-7, Standard Practice for Salt Spray (Fog) Apparatus.
3. ASTM C645, Standard Specification for Nonstructural Steel Framing Members.
4. ASTM C653, Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation.
5. ASTM C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
6. ASTM C840, Standard Specification for Application of Finishing Gypsum Board.
7. ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033in. (0.84 mm) to 0.12 in. (1.84 mm) in Thickness.
8. ASTM D226, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

C. American Welding Society (AWS):

1. AWS D1.3, Structural Welding Code - Sheet Steel.

D. Gypsum Association (GA):

1. GA-600, Fire Resistance Design Manual Sound Control.

E. International Code Council (ICC):

1. International Building Code (IBC), as amended by state where Project is located.

F. Steel Stud Manufacturers Association (SSMA)

1. ICBO ER-4943P, Product Technical Information.

G. Underwiters Laboratory (UL):

1. UL Fire Resistance Design Directory.

1.4 QUALITY ASSURANCE

A. Fire Resistance Rating: Where gypsum board Work with fire resistance ratings are indicated or required to comply with governing regulations, provide materials and installations identical with those of applicable assemblies which have been tested per ASTM E119 by fire testing laboratories acceptable to authorities having jurisdiction.
   1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File Numbers in GA-600 or to design designations in UL "Fire Resistance Directory" or in listing of other testing and inspecting agencies acceptable to authorities having jurisdiction.

B. Welding: Qualify procedures and personnel according to AWS D1.3.

C. Codes and Standards: Comply with provisions of Codes, Specifications and Standards listed in Article 1.3 of this Section, except as otherwise indicated.

1.5 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Submit manufacturer's product Specifications and installation instructions for each component of gypsum drywall and framing systems including other data as may be required to show compliance with these Specifications. Provide catalog cuts of accessories.

1.6 DELIVERY, STORAGE & HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer and supplier.

B. Store materials protected from corrosion and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Metal Framing and Gypsum Boards: For non-fire-rated and generic fire-rated assemblies, any ICC-ES approved manufacturer's products may be used. For proprietary fire-rated systems and all shaft wall assemblies, provide framing and gypsum board products by same manufacturer.

2.2 METAL FRAMING MATERIALS

A. Exterior Enclosure Framing Materials:
   1. Steel Sheet: ASTM A653 / A653M: Structural steel, zinc-coated, of grade and coating as follows:
      a. Grade 33 for 18 gauge and lighter.
      b. Grade 50 for 16 gauge and heavier.
      c. Actual metal thickness for gauge sizes indicated are based on Table on Page 5 of SSMA ICBO ER-4943P.
      d. Coating: G90.
   2. Steel Studs: Manufacturer’s standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with SSMA, and as follows:
      a. Minimum uncoated steel thickness: 33 mil thickness except as otherwise shown on Structural Drawings.
      b. Flange width: Per schedule on Structural Drawings.
   3. Steel Sill Track: Manufacturer’s standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, complying with SSMA as follows:
      a. Minimum uncoated steel thickness: Matching steel studs.
      b. Flange width: 1-5/8 inches, except as otherwise noted on Drawings.
   4. Vertical Slide Clip: As required.
   5. Deadload Stud Clip: As shown on Structural Drawings.
   6. Steel Head Track: Special 12 gauge formed zinc-coated steel as shown on Structural Drawings.

7. Screws: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
   a. Head type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
   b. Board attachment: Steel drill screws, ASTM C954, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

B. Interior Wall / Partition Framing Materials:
1. Studs: ASTM C645:
   a. Provide studs in mil thicknesses as indicated. If not indicated provide studs as required to comply with ASTM C754 or manufacturer's load tables for maximum deflection of L/240 at 5 pounds per square foot.
   b. Provide studs at wall corners and partition ends where corner guards are indicated of thickness as indiated on Drawings.
2. Depth of Section: As indicated on Drawings.
3. Floor Runners: Match stud widths; provide runners with minimum 1-1/4 inch depth for floor support of studs and for vertical abutment of gypsum board Work to other Work.
4. Deflection Track: Subject to requirements, provide one of the following types:
   a. Basis of Design: SLP-TRK by SlipTrack Systems, www.sliptrack.com.
   b. Fire Trak by Fire Track Corp., is approved equal, www.firetrak.com.
   c. The System Slotted Deflection Track by Metal-Lite, a Division of Perfectwall.net, www.metal-lite.net.
   d. Slotted Deep Leg Track (SDLT) by Scafco Steel Stud Co., www.scafco.com.
   e. Approved Substitution.
5. Furring Channels: ASTM C645, 7/8-inch deep, 18 mil minimum thickness of base metal hat-shaped.
6. Zee Furring: Dietrich or equal vertically slotted, depth as indicated, 18 mil and 33 mil thickness.
7. Alignment Channels: 1-1/2 inch cold-rolled as specified for ceiling suspension.
8. Corner Angles: Galvanized formed angles, thickness to match studs.

C. Screws:
1. For Gypsum Base: Self-drilling cadmium-plated bugle head screws.
2. For Studs-to-Runners: Self-drilling, 3/8-inch pan head (S-12) or Tek screws.

D. Metal Backing and Reinforcement: Provide backing for all items required to be attached to gypsum board surfaces unless studs are provided for the attachment. Backing heavier than 33 mils (20 gauge) shall not protrude past the plane of stud flanges. Provide heavier gauge studs where indicated.
1. Heavy-Duty Concealed Backing: Backing for items including wall-mounted television mounts, monitor brackets, grab bars, and folding shower seats. Provide 97 mils (12 gauge) steel backing plates welded or screwed to double 33 mil studs each side.
2. Medium-Duty Concealed Backing: Backing for items including toilet partitions, urinal screens and crash rails: Provide 400T125-33 track sideways, centered on partition, screen or bracket and screwed to regular wall studs on each side with 2 self-tapping screws per stud.
3. Standard-Duty Concealed Backing: Backing for items including all surface-mounted toilet accessories, wall-mounted light fixtures, wall-mounted cabinets, countertop cleats, hanging rails and other such items. Provide 33 mils (20 gauge) galvanized sheet metal 6-inches wide screwed to face of studs, with two self-tapping screws per stud.

4. Concealed Backing for Vertical Shelf Standards: Locate studs installed with web directly behind vertical standards. Provide supplemental studs where shelf standards do not align with typical stud spacing.
5. Concealed Backing for Stair Railings: Provide 68 mils (14 gauge) steel backing screwed to 33 mil studs.
6. See Section 06 10 53 for concealed wood backing for standing and running wood trim and wood base, where occurs.

E. Expansion Anchors:
1. Kwik Bolt by Hilti, www.hilti.com.
2. Redhead by Ramset Fastening Systems, www.ramset.com.
3. Trubolt Wedge Anchors by ITW Red Head, www.itwredhead.com.
4. Approved Substitution.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type specified, and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

2.3 SHAFT WALL SYSTEM

A. Manufacture: Proprietary UL-listed and/or ICC-ES approved system with hourly ratings as shown. Furnish all components from the manufacturer as per UL or ICC-ES listing.

B. Framing Members: C-H and E type galvanized studs unless otherwise indicated. Provide in mil thicknesses indicated, if not indicated, size studs per manufacturer's load table for 1/240 deflection at 10 pounds per square foot sustained pressure.
1. Provide J-runners in same thickness as studs at top and bottom of framing.
2. Provide 33 mil J-runners with 3 inch vertical leg at all door jambs.
3. Stud widths: 4 inches, unless other noted.

2.4 MISCELLANEOUS MATERIALS

A. Special Metal Fabrications:
1. 54 mil galvanized sheet steel formed glass stops at tops of glass walls.
2. 43 mil galvanized zees 1 x 1 x 1 inch for offset attachment of stud tracks to fire-proofed beams.
3. “J” and zee 18 mil galvanized sheet steel formed to shapes shown or described.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION FOR METAL FRAMING SYSTEMS

A. Ceiling Anchorages: Provide hangers and inserts necessary to support suspended ceiling below concrete slabs before concrete is poured and in time to avoid delay in work. Give particular attention to the correct location and alignment of hangers and inserts.

B. Before sprayed-on fireproofing is applied, attach clips, runners, end studs or ceiling runners to surfaces indicated to receive sprayed-on fireproofing.
1. Where partition track will not have sufficient contact with bottom of steel beams, provide steel offset zees attached to beams with powder actuated anchors at 24 inch centers.

C. After sprayed-on fireproofing has been applied, remove fireproofing as needed to complete installation of gypsum drywall assemblies with framing in direct contact with structure. Protect remaining fireproofing from damage.

D. Sound deadening of steel door frames. Use one of the following methods:
1. Fill door jambs solid with acoustical insulation prior to erection.

3.3 INTALLATION, GENERAL

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated. Gypsum board assemblies also comply with requirements in ASTM C840 that apply to framing installation.

3.4 INSTALLATION OF METAL FRAMING SYSTEMS

A. Metal Framing Installation: Per specified Standards, Structural Drawings and as modified herein.

B. Do not bridge control joints with framing system, frame both sides of joints with framing members.

C. Install isolation strips between metal framing and exterior concrete and masonry walls.

D. Prior to application of spray-on fireproofing, install all clips, hangers, support sleeves and other attachments required to penetrate the fireproofing.

3.5 INTERIOR WALL / PARTITION FRAMING SYSTEMS

A. Install work free of contact with or attachment to mechanical ducts, pipes, distribution boxes or their insulation. In full height and fire rated partitions, provide framing around ducts with headers and studs to provide 1 inch clearance around ducts.

B. Partition framing: Install studs vertically into floor and ceiling runners at 16 inch centers unless otherwise shown.

1. Install supplemental framing or subframing as required to facilitate installation of mechanical, electrical devices and equipment as located on Drawings.
2. Anchor studs to bottom runners with screws when located adjacent to metal door frames, partition intersections and corners.
3. Provide cut-to-length studs between top of framed openings and ceiling runners at required spacing.
4. Provide additional framing and blocking as required to support gypsum board at openings and to support built-in items and attached fixtures.
5. Cut studs 5/8-inch short of the ceiling runner webs on full height partitions, and attach studs to the ceiling tracks only where slotted deflection tracks are used.
   a. The ceiling runners shall function as deflection channels.
6. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor / roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install deflection tracks and supplemental framing around structural and other members extending below floor / roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure. Screw studs to deflection tracks.

C. Framing at Door Openings: Install double studs of thicknesses noted below on each side of metal door frames, accurately centered and securely attached to the anchor clips or bottom runners with self-tapping screws. The doubled studs need not be in contact. Screw gypsum board to each of the doubled studs as required for typical studs, to form a stiff box column at each jamb.

1. Doors up to 3 feet wide: Two 18 mil studs.
2. Doors over 3 feet wide: Two 33 mil studs.

D. Examine Structural and Mechanical Drawings to determine amount of interference above ceilings and amount of additional framing required. Offset framing as required and provide additional bracing as necessary to stabilize partitions.

E. Construct large openings such as sliding door openings with headers and jamb studs per Schedule and Details on Structural Drawings.

F. Provide diagonal bracing to structure for all partial height wall framing as indicated on Drawings. Where doors are shown to be ceiling height, brace each jamb.

G. Chase Walls:

1. Align two parallel rows of floor and ceiling runners and secure as hereinafter specified for partitions.
2. Position metal studs vertically in runners, 24 inch centers.

3. Brace studs with 2-1/2 inch metal studs installed horizontally at 48 inch height or provide 12 inch high gypsum board gussets.
4. Install gypsum board as hereinafter specified for partitions.

H. At all partitions to receive ceramic tile, install corner angles at all interior corners so backer board of adjacent walls is attached to common framing member.

3.6 INSTALLATION OF SHAFT WALLS

A. Provide "cavity shaft wall" as shown consisting of metal runners, studs, shaft liner, gypsum board and fasteners erected and applied in accordance with the shaft wall manufacturer's printed instructions. Provide fireproof assemblies for the hourly rating shown or required and complying with UL listing.

B. On floor-supported walls, install shaft wall liner without screws unless specifically required by manufacturer. Use full length shaft wall liner up to 14 feet in height; on higher walls locate horizontal liner joints in the top and bottom thirds of the wall and stagger the joints. Provide metal stud backing for all horizontal shaft wall liner joints if required by ICC-ES approval or fire test.

3.7 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/8-inch in 10 feet.

B. Maximum Variation From Plumb: 1/8-inch in 10 feet.

3.8 FIELD QUALITY CONTROL

A. Installer shall provide one field copy of ASTM C745 for reference by Architect.

B. Verify that wall framing meets specified tolerances.

C. In presence of Architect and Contractor, installer’s supervisor shall measure wall framing for compliance with specified tolerances for plumb using multi-pointer, 5-beam, self-leveling laser.

D. For each floor, Architect shall randomly select 5 locations for measurement. If measurements indicate non-compliance, additional locations may be selected by Architect.

E. Installer shall correct partition framing that does not meet requirements of the Contract Documents.

F. Cost for corrective work where doors cannot be adjusted to function properly because partition framing does not comply with requirements for plumb shall be at framing installer expense.

END OF SECTION

DIVISION 09 – FINISHES

09 51 10 - ACOUSTICAL CEILINGS

A. Basis of Design Manufacturer:
   1. Provide products to match existing unless otherwise indicated.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Submittals:
   1. Product Data: Submit product data and shop drawings.
   2. Delegated Design Submittal: For seismic restraints for ceiling systems. Include design calculations for seismic restraints, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Section Includes:
   1. Acoustical tile ceilings.

D. Acoustical Ceilings - General:
   1. Coordinate ceiling applications with installation requirements for existing ceilings and other ceiling applications.
   2. Where tile panels may be specified or existing as tegular installations, do not shim grid at deck to grid partitions. Each tile shall be neatly cut flush to the drywall partition. Exposed cut edges shall be painted to match the face of tile. Tiles shall not be continuous above deck to grid partitions.
   3. Installed System: Conform required UL ratings for floor/ceiling, roof/ceiling, and designated ceiling assemblies; tested in accordance with ASTM E119 as applicable.
   4. Fire Resistance Rating: Ceiling system identical to that used in tested assembly for the UL design and rating specified, with each panel bearing the UL label.
   5. Acoustical Units - General: ASTM E1264, Class A.
      a. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.
      b. Provide units with manufacturer's proprietary anti-humidity, sag-resistant composition and anti-microbial treatment to inhibit the propagation of mold and mildew.

E. Acoustical Tile Ceilings
   1. Acoustical Tile Standard: Provide
      a. manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
      b. Color: As indicated on Drawings.
      c. Edge/Joint Detail: As indicated by manufacturer's designation.
      d. Size: As indicated on Drawings.
      e. Basis of Design Manufacturer:
         i. Products: As scheduled on Drawings.
         ii. Substitution: Section 01 60 00 - Product Requirements

F. Suspension Systems:
   1. General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
   2. Coordinate suspension systems with ceiling systems.
      a. Suspension System: Basis of Design: Provide Interlude XL HRC Dimensional Tee by Armstrong World Industries, or comparable product by approved manufacturers.
      b. Metal Edge Moldings and Trim: Basis of Design: Provide Shadow Molding 7874 by Armstrong World Industries, or comparable product by approved manufacturers.
   3. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate duty.
      a. Profile: Tee; 15/16 inch (24 mm) or 9/16-inch-wide face as indicated for specified acoustical panel type.
      b. Finish: White painted.

G. Acoustical Insulation: Refer to section 07 21 00 - Thermal and Acoustical Insulation.

H. Installation:
   1. Install suspension system and ceiling systems in accordance with ASTM C636/C636M and manufacturer's instructions.
   2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
   3. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

4. Locate system on room axis according to reflected plan.
5. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
6. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
7. Lay acoustical insulation for a distance of 24 inches (610 mm) on both sides of acoustical partitions.

SECTION 09 51 33 - ACOUSTICAL METAL PAN CEILINGS

A. Section Includes:
   1. Acoustical metal pans and associated suspension system for interior ceilings.

B. Submittals:
   1. Product Data: For each type of product.
   2. Samples: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
      a. Metal Pans: Set of 6-inch- (150-mm-) square Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
   3. Delegated -Design Submittal: For seismic restraints for ceiling systems.
      a. Include design calculations for seismic restraints, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Quality Assurance:
   1. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
   2. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
      a. Build mockup of typical ceiling area as directed by Architect, minimum size of mock-up, 10’x10’
      b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Acoustical Metal Pans, General:
   1. Basis of Design Product and Additional Requirements: Refer to finish legend.
   2. Complying with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.
   3. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
   4. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E 84.
   5. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent pads.
      a. Adhesives shall have a VOC content of 70 g/L or less.

E. Metal Suspension Systems, General:
   1. General: Complying with ASTM C 635/C 635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold-down clips as required.
   2. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
   3. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.
   4. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
      a. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
      b. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch-(2.69-mm-) diameter wire.
   5. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place to molding and trim at perimeter.
   6. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction.
   7. Seismic Design Category: Refer to structural drawings for seismic design category and requirements.

F. Direct-Hung, Standard-Grid, Metal Suspension System for Acoustical Metal Pan Ceiling:
   1. Manufacturers:
      a. Armstrong World Industries, Inc.
      b. CertainTeed (Hunter Douglas Architectural Products, Inc.)
      c. USG Corporation
   2. Suspension System: For lay-in and torsion-spring-hinged pans.
   3. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, preprinted, electrolytic zinc-coated or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation, with prefinished, cold-rolled, 15/16-inch (24-mm-) wide sheet metal caps on flanges.
      a. Structural Classification: Intermediate-duty system.

b. End Condition of Cross Runners: Override (stepped) or butt-edge type.
c. Face Design: Flat, flush.
d. Cap Material: Aluminum cold-rolled sheet.
e. Cap Finish: Painted to match color of metal pan.

4. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

G. Acoustical Sealant:
1. Comply with requirements in Section 07 92 00 - Joint Sealants.

H. General Finish Requirements:
1. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

I. Aluminum Finishes:
1. Color-Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
2. Architect to select color from manufacturer’s full range.

J. Metallic-Coated Steel Sheet Finishes:
1. Color-Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
a. Architect to select color from manufacturer’s full range.

K. Installation:
1. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions.
3. Suspend ceiling hangers from building's structural members and as follows:
a. Install hangers plumb and free from contact with insulation or other objects.
b. Splay hangers only where required to miss obstructions.
c. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns.
d. Do not support ceilings directly from permanent metal forms or floor deck.
e. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
f. Do not attach hangers to steel deck tabs.
g. Do not attach hangers to the steel roof deck. Attach hangers to structural members.
h. Space hangers not more than 48 inches (1200 mm) o.c., along each member supported directly from hangers unless otherwise indicated.
i. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns.
5. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.
6. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
7. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings.
8. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with installation tolerances according to CISCA's "Metal Ceilings Technical Guidelines."
9. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules.
10. Install hold-down clips where indicated.

SECTION 09 65 13 RESILIENT BASE & ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Resilient base.
B. Transition edge guards.
C. Adhesives.

1.2 RELATED SECTIONS
A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
C. Section 01 77 00 - CLOSEOUT PROCEDURES: Warranties and maintenance materials.
D. Section 01 78 23 - OPERATION & MAINTENANCE DATA: Manufacturer's instructions for care and maintenance.
E. Section 06 83 00 – FIBER REINFORCED LAMINATE (FRL): for wall protection product to be applied to substrate above Work of this Section.
F. Division 09 – FINISHES, INTERIOR FINISH SPECIFICATIONS: for selected manufacturers, products, patterns and colors.
G. Division 09 – FINISHES: for coordination of transition edge guards at transitions between scheduled floor coverings.
H. Section 09 06 00 – ROOM FINISH SCHEDULE: for locations of spaces scheduled to receive floor coverings.
I. Section 10 26 00 – WALL PROTECTION: for coordination of resilient base installation at corner guards and other wall protection products.

1.3 REFERENCES
A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. ASTM International (ASTM):
   1. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
   2. ASTM F1861, Standard Specification for Resilient Wall Base.
C. National Fire Protection Association (NFPA):
   1. NFPA 101, Life safety Code.
   2. NFPA 253, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
D. Resilient Floor Covering Institute (RFCI):
   1. RFCI IP#1, Recommended Installation Practice for Homogeneous Sheet Flooring, Fully-Adhered.

1.4 REGULATORY REQUIREMENTS
A. Fire Test Response Characteristics: Meet Class I critical radiant flux classification requirements, not less than 0.45 Watts per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
B. Volatile Organic Compounds (VOC): Comply with local regulations controlling use of volatile organic compounds for installation products.
C. Work of this Section shall meet infection control requirements of the Washington State Department of Health.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs workers for this Project that are competent in techniques required by manufacturer for rubber base installation.
B. Fire Test Performance: Provide rubber base material to meet NFPA 101 fire test performance criteria.
C. As a prerequisite to Substantial Completion, installed Work of this Section shall be inspected and approved in writing by Owner's Environmental Services (EVS) Department.

1. EVS inspection shall be scheduled to occur simultaneously with Architect's inspection for Certification of Substantial Completion.
2. Coordinate date of inspection with Contracting Officer and Architect.

1.6 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.
B. Product Data: Submit manufacturer's technical data and installation instructions for each type of flooring, adhesives, underlayment and accessories.
   1. Floors subject to wheel traffic: Submit manufacturer's letter or printed literature with specific recommendations for installation of floor covering.
C. Samples: Submit manufacturer's standard sample size in duplicate.

1.7 CLOSEOUT SUBMITTALS

A. Submit, under the provisions of Section 01 78 23, manufacturer's instructions for care and maintenance of floor covering.
B. Submit, under the provisions of Section 01 77 00, maintenance extra stock where directed by Contracting Officer.
C. Submit, under the provisions of Section 01 77 00, executed warranty.

1.7 DELIVERY, STORAGE & HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained with range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.8 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods.
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
C. Close spaces to traffic during floor covering installation.
D. Close spaces to traffic for 48 hours after floor covering installation.
E. Install floor coverings after other finishing operations, including painting, have been completed.

1.9 MAINTENANCE EXTRA STOCK

A. Provided 10 linear feet for every 500 linear feet installed for each color.
B. Deliver where directed by Contracting Officer.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Approved Manufacturers: Subject to Project requirements, provide products by one of the following:
   1. Johnsonite Inc., www.johnsonite.com.
   2. Roppe Corp., www.roppe.com.
   3. Approved Substitution.
B. Resilient Base Standard: ASTM F1861.
   1. Height: 4 inches, unless otherwise noted or scheduled.
   2. Thickness: 0.125 inch.
   3. Style: Top-set cove, unless otherwise noted or scheduled.
   4. Outside Corners: Job-formed.
   5. Inside Corners: Job-formed.

6. Lengths: Coils in manufacturer's standard length. 4 foot sections are not acceptable.
7. Selected Colors & Patterns: As scheduled in Schedule of Interior Finish Materials.

2.2 TRANSITION EDGE GUARDS

A. Approved Manufacturers: Subject to Project requirements, provide products by one of the following:
   1. Roppe Corporation, www.roppe.com.
   2. Approved Substitutions.
B. Extruded or molded heavy duty tapered vinyl or rubber carpet edge guard for transition between resilient flooring and carpet. Provide profiles appropriate for applications.
   1. Colors: As scheduled in Schedule of Interior Finish Materials.

2.3 ADHESIVES

A. No discernible odor, meeting VOC requirements specified in Article 1.3 of this Section.
B. Water-resistant type as manufactured or recommended by flooring and accessories manufacturers for field installation and flash coving.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that surfaces are smooth, flat and are ready to receive Work.
B. Verify that wall protection panels are installed and ready to receive rubber base.
C. Do not begin installation work until substrate meets requirements.
D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and associated installation materials into spaces where they will be installed at least 48 hours in advance of installation.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's printed 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 or areas where base is required.
C. Bond tight to floor and wall surfaces with continuous adhesion to solid substrate.
D. Provide resilient base where scheduled and around all casework.
E. Install resilient base and transition edge guards in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
F. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends and without any joints in resilient base material within 3 feet of all outside corners. Ensure full adhesion to substrate.
   2. Inside Corners: Use straight pieces of maximum lengths possible.
G. Do not stretch resilient base during installation.
H. Install resilient base at wall protection as specified in Section 10 26 00.

3.3 RESILIENT ACCESSORY INSTALLATION

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

3.6 CLEANING & PROTECTION

A. Comply with manufacturer's printed instructions for cleaning and protection of resilient products.
B. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by finish material manufacturer.
C. Protect resilient products from mars, marks, indentions, and other damage from construction operations and placement of equipment and fixtures during remainder of Construction Period.
D. Cover resilient products until date of Substantial Completion.

END OF SECTION

SECTION 09 65 16 RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Sheet vinyl floor covering with welded seams.
- B. Installation accessories.

1.2 RELATED SECTIONS
- A. Drawings, General Conditions and Division 01 apply to Work of this Section.
- B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
- C. Section 01 43 39 – MOCK-UPS: for performance mock-up requirements.
- D. Section 01 77 00 - CLOSEOUT PROCEDURES: Warranties and maintenance materials.
- E. Section 01 78 23 - OPERATION & MAINTENANCE DATA: Manufacturer's instructions for care and maintenance.
- F. Section 01 33 12 – COORDINATED SUBMITTAL REQUIREMENTS: for simultaneous submittal of related Submittals from different Specification Sections.
- G. Section 03 35 10 – CONCRETE FLOOR SLAB PREPARATION: for preparation of concrete substrate and Substrate Acceptance for Flooring Installation & Product Warranty Form.
- H. Section 03 54 00 – CAST UNDERLAYMENT: for cementitious patching and leveling underlayments.
- I. Division 09 – FINISHES, Interior Finish Specification: for selected patterns and colors.
- J. Section 09 06 00 – FINISH SCHEDULE: for locations where selected floor coverings are required.
- K. Section 09 65 13 – RESILIENT BASE & ACCESSORIES: for resilient wall base and accessories installed with resilient sheet flooring, where scheduled.
- L. Section 12 32 16 – PLASTIC LAMINATE-CLAD CASEWORK: for coordination of base height of casework scheduled to receive flash coved base.

1.3 REFERENCES
- A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
- B. United States Access Board, Americans with Disabilities Act (ADA):
  1. ADA Accessibility Guidelines for Buildings and Facilities (ADAAG).
- C. ASTM International (ASTM):
  1. ASTM D2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  2. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
  3. ASTM F1516, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when recommended).
- D. Resilient Floor Covering Institute (RFCI):
  1. RFCI IP #1, Recommended Installation Practice for Homogeneous Sheet Flooring, Fully-Adhered.

1.4 REGULATORY REQUIREMENTS
- A. Volatile Organic Compounds (VOC): Comply with local regulations controlling use of volatile organic compounds for installation products.
- B. Static Coefficient of Friction: ADAAG Appendix Note A4.5 states "A static coefficient of friction of 0.6 is recommended for accessible routes and 0.8 for ramps." Meet the following static coefficient of friction requirements when tested in accordance with ASTM D2047:
  1. 0.6 for Accessible Routes.
  2. 0.8 for Ramps.
- C. Fire Test Performance: Provide flooring material to meet the following fire test performance criteria.

1. Critical radiant flux: 0.45 watts per square centimeter or greater when tested in accordance with ASTM E648.

D. Work of this Section shall meet infection control requirements of the Washington State Department of Health.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project that are competent in heat-welding techniques required by manufacturer for floor covering installation.

B. Performance Mock-Ups: Prior to installation, submit mock-up of flash cove base under the requirements of Section 01 43 39. Approved mock-up shall establish Project Standard for the Work.

C. As a prerequisite to Substantial Completion, installed Work of this Section shall be inspected and approved in writing by Owner's Environmental Services (EVS) Department.

1. EVS inspection shall be scheduled to occur simultaneously with Architect's inspection for Certification of Substantial Completion.
2. Coordinate date of inspection with Contracting Officer and Architect.

1.6 ACTION SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Submit manufacturer's technical data and installation instructions for each type of flooring, adhesives, underlayment and accessories.

1. Floors under hospital beds: Submit manufacturer's letter or printed literature with specific recommendations for installation of flooring.

C. Samples: Submit the following samples in duplicate:

1. Sheet flooring: Minimum 6 x 9 inches of each required color.
2. Vinyl Composition Tile flooring (VCT): Minimum 3 x 3 inches of each color.
3. Heat-welded seam samples: For each sheet flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6 x 9 inches sample applied to a rigid backing and prepared by installer for this Project.
4. Rubber base: Manufacturer's standard sample size.

D. Substrate Acceptance for Flooring Installation & Product Warranty Form: As prerequisite to installation work, submit executed form. Blank form is available at end of Section 03 35 10.

1.7 INFORMATIONAL SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

C. As a prerequisite to installation work, provide a copy of RFCI IP #1 to be maintained at Contractor's field office for reference during installation.

1.8 CLOSEOUT SUBMITTALS

A. Submit under the provisions of Section 01 78 00.

B. Maintenance Instructions: For O&M Manuals, submit the following:

1. Manufacturer's printed instructions for maintenance.
2. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

C. Deliver maintenance extra stock where directed by Contracting Officer.

D. Warranty: Submit executed copy of warranty.

1.9 MOCK-UPS

A. Prior to installation, submit performance mock-up of flash cove base under requirements of Section 01 43 39. Mock-up(s) shall be constructed using plywood substrate.

1. Mock-up to include the following:
   a. Inside and outside corner.
   b. Use scheduled floor covering.
   c. Use selected or proposed welding rod color.
   d. Scheduled cove cap strip.
   e. Height: Sufficient to provide 6 inch high flash cove base and scheduled cap strip.
   f. Size: Sufficient side to provide horizontal seam at flash cove base and field floor covering.
2. Separate mock-ups may be constructed for inside and outside corners.

B. Mock-up to be approved in writing by Owner Environmental Services Department (EVS). Schedule mock-up review with Contracting Officer.

C. Maintain approved mock-up(s) on site for later reference during execution of the Work.

1.10 DELIVERY, STORAGE & HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained with range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.11 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods.
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.12 MAINTENANCE EXTRA STOCK

A. Save left-over vinyl sheet vinyl and deliver where directed by Contracting Officer.

B. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with manufacturer’s labels describing contents.
   1. Resilient Sheet Flooring: Furnish quantity of full-size units equal to two (2) percent of amount installed for each type indicated.

1.13 WARRANTY

A. Provide manufacturer’s warranty, 10 years from date of original installation. Applies when product applied per manufacturer’s instructions.

B. Manufacturer warranty against delamination due to negative side moisture migration or moisture-born contaminates. Includes both labor and materials necessary to repair or replace floor covering if repairs acceptable to Contracting Officer cannot be made.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOORING

A. Selected manufacturers, patterns and colors as scheduled in Interior Finish Specification.
   1. Welding rod: As scheduled in Interior Finish Specification.

2.2 TROWELABLE UNDERLAYMENTS & PATCHING COMPOUND

A. As specified in Section 03 35 10.

2.3 INSTALLATION ACCESSORIES

A. Primer: Meet applicable VOC requirements specified in Section 01 81 13 and almost no discernible odor. Primer as recommended by floor covering manufacturer for priming substrates under sheet vinyl flooring.
B. Cove Sticks: By floor covering manufacturer for application.
C. Cove Cap Strip: Aluminum or vinyl as scheduled.
D. Sealant: One part polyurethane sealant to seal joints between flooring and door frames and at thresholds. Can be pigmented with water-based coloring.
E. Adhesives: Epoxy adhesive as manufactured or recommended by flooring and accessories manufacturers for field installation, appropriate for areas subjected to heavy traffic especially rolling loads.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine substrates, with Installer present, verify that surfaces are smooth, flat and within tolerances specified in Section 03 35 10, meet vapor emission and alkalinity tolerances required by flooring and adhesive materials manufacturer and are ready to receive Work.
B. Obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.
C. Do not begin installation work until:
    1. Substrate meets requirements.
    2. Architect has received executed Substrate Acceptance for Flooring Installation & Product Warranty Form.
    3. Mock-up is approved.
D. Vacuum surface to be covered.

3.2 INSTALLATION

A. At terminations where two different types of resilient flooring meet, build up substrate with underlayment so that finished surfaces at joints between different flooring materials are uniform and level.
B. Trowel underlayment as required to feather edge and make transition appear level.
C. Cut termination of flooring in straight line to make a tight hairline joint at juncture of two different materials.
D. At doorways, terminate flooring under door.
E. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.
F. Lay out sheet floor coverings as follows:
    1. Maintain uniformity of floor covering direction.
    2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
    3. Match edges of floor coverings for color shading at seams.
    4. Avoid cross seams.
G. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures and built-in furniture, including cabinets and drains.
H. Extend floor coverings into toe spaces, door reveals, closets and similar openings.
I. Maintain reference markers, holes or openings that are in place or marked for future cutting by repeating on floor coverings as marked in substrates. Use chalk or other non-permanent marking device.
J. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks and other surface imperfections.
K. Install edge strips at transition to other floor coverings. Trim edge strips to provide square edges for abutting to flooring of different thickness.
L. Flash Cove Base: Where scheduled, install flash coved base per approved mock-up.
    a. Height of Base: At new construction height shall be 6 inches.

M. Seam Sealing: All seams in sheet flooring shall be heat welded.
   a. Seams sealed with sealant are not acceptable.
N. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld and finish seams to produce surfaces flush with adjoining floor covering surfaces.
   1. Prepare seams in sheet flooring with manufacturer's special routing tool and heat weld with thread in accordance with manufacturer's instructions. Trim off excess thread.
   2. Inspect all seams after welding and trimming. Re-trim high spots and fuse all incomplete seals with special tool provided by manufacturer.
O. Hand roll flooring at perimeter and seams to assure adhesion. Roll with 100 pound roller in field areas. Refer to specific rolling instructions of flooring manufacturer.

3.4 CLEANING & PROTECTION
A. Protect installed flooring against damage from rolling loads for 48 hours after initial installation.
B. Provide plywood or hardboard protection when moving heavy loads over floors.
C. Use dollies to move stationary equipment or furnishings across floor.
D. Perform following operations upon completion of sheet vinyl flooring:
   1. Do not wash floor until time period recommended by sheet vinyl flooring manufacturer has elapsed to allow resilient flooring to become well sealed in adhesive.
   2. Damp mop floor being careful to remove black marks and excessive soil.
   3. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturer.

END OF SECTION

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SECTION 09 91 00 PAINTINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Surface preparation for painting.
B. Field application of paints and other coatings.
C. Scope: Finish all new and existing unfinished interior surfaces indicated (but not limited to those) on Drawings. All factory primed and/or unfinished materials exposed to view shall be painted.
D. Do Not Paint or Finish the Following Items:
    1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
    2. Items indicated to receive other finishes.
    3. Items indicated to remain unfinished.
    4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
    5. Floors, unless specifically so indicated.
    6. Ceramic and other tiles.
    7. Glass.
    8. Concealed pipes, ducts, and conduits.
E. Manufacturers and colors as indicated on Drawings.

1.2 RELATED SECTIONS

A. Drawings, General Conditions and Division 01 apply to Work of this Section.
B. Section 01 33 00 - SUBMITTAL PROCEDURES: Submittal procedures.
C. Section 01 77 00 - CLOSEOUT PROCEDURES: for prerequisites to Substantial Completion, extra stock.
E. SCHEDULE OF INTERIOR FINISH MATERIALS on Drawings: for color selections.
F. Division 09 – FINISHES, Interior Finish Specification: for selected patterns and colors.
G. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: for surface preparation of gypsum board substrate.
H. Section 09 91 02 – INTERIOR PAINTING SCHEDULE: for selected interior coating systems.
I. Section 09 91 04 – EXTERIOR PAINTING SCHEDULE: for selected exterior coating systems.

1.3 REFERENCES

A. Reference Standards shall be latest adopted edition on issue date of Contract Documents.
B. Environmental Protection Agency (EPA):
    1. Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
C. Master Painters Institute (MPI):
    1. Architectural Painting Specification Manual, including Identifiers, Evaluation, Systems, Preparation and Approved Product List. (hereafter referred to as the MPI Painting Manual) as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

1.4 COORDINATION

A. Match Existing (if applicable): Contractor to provide 'draw downs' and schedule a walk through with Architect for field verification and approval prior to implementation.

1.5 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this Section.
    1. Standard coating terms defined in ASTM D16 apply:
        a. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-deg meter.

b. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-deg meter.
c. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-deg meter.
d. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-deg meter.

1.6 ACTION SUBMITTALS
A. Submit under the provisions of Section 01 30 00.
B. Submit three paper chip samples, 8.5 x 11 inch in size illustrating colors as indicated on Drawings for approval by Architect prior to beginning Work of this Section.
C. Closeout: At project completion provide an itemized list complete with manufacturer, paint type and color coding for all colors and locations used for Owner's later use in maintenance.

1.7 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 5 years documented experience.
B. Applicator Qualifications: Company specializing in performing type of work specified with minimum 3 years experience.
C. Visual Standards: Each distinct area of finished work shall be free of variations in color and sheen, orange peel, runs, blistering, cracking, scratches, dust and other contaminants.

1.8 REGULATORY REQUIREMENTS
A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.9 DELIVERY, STORAGE & HANDLING
A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 deg F and a maximum of 90 deg F, in ventilated area, and as required by manufacturer’s instructions.

1.10 ENVIRONMENTAL WASTE MANAGEMENT & DISPOSAL REQUIREMENTS
A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.
D. Ensure adequate continuous ventilation and sufficient heating and lighting is in place.
E. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be regarded as hazardous products. Recycle and dispose of same subject to regulations of applicable authorities having jurisdiction.
F. Set aside and protect surplus and uncontaminated finish materials not required by Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.
G. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 MAINTENANCE EXTRA STOCK

A. Provide [1] [5] full gallons of each type and color of finish coats used on Project. Label with paint manufacturer, paint type, product number, color, sheen, and its representative use on Project. Deliver where directed by Contracting Officer.

1.12 WARRANTY

A. Colors of all surfaces finished under this Section shall, at end of one year, have remained free from serious fading, and variations, if any, shall be uniform. All materials shall have their original adherence at end of one year, and there shall be no evidence of blisters, peeling scaling, chalking, streaks or stains at the end of this period. Washing with alkali-free soap and water shall remove surface dirt without producing deteriorating effects.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: As scheduled on Drawings, applicator to match other manufacturer's colors as needed.

D. Low Odor – Low VOC Finish.

2.2 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from same manufacturer; no exceptions. Products for each general purpose shall be compatible.

B. Paints and Coatings:

1. Parker Paint, www.comex-paint.com/parker/.
2. No Substitutions.

C. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by same manufacturer.

2.3 PAINTS & COATINGS – GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each coating material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by manufacturer.

1. For good flow and brushing properties.
2. Capable of drying or curing free of streaks or sags.

C. Volatile Organic Compound (VOC) Content: Provide Low or No-VOC products whenever possible.

1. Provide coatings that comply with most stringent requirements specified in the following:

a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

D. Flammability: Comply with applicable code for surface burning characteristics.

2.4 PAINT SYSTEMS

A. Interior Paint Systems: As scheduled in Section 09 91 02.

B. Exterior Paint Systems: As scheduled in Section 09 91 04.

2.5 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler of matching color.

D. Spray-Painting Equipment: Of ample capacity, suited to type and consistency of paint or coating being applied and kept clean and in good working order at all times.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
4. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using methods recommended by the manufacturer for achieving best result for substrate under project conditions.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Marks: Seal with shellac those which may bleed through surface finishes.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

I. Asphalt, Creosote, or Bituminous Surfaces to be Painted: Remove foreign particles to permit adhesion of finishing materials. Apply latex based sealer or primer.

J. Concrete Floors to be Painted: Remove contamination, acid etch if needed, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

K. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
N. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
O. Metal Door Frames to be Painted: Prime surfaces using primers required by field finish paint manufacturer and prime metal door top and bottom edge surfaces.

3.3 APPLICATION – PAINT
A. Do not apply finishes until color selection has been approved by Architect or Owner.
B. Apply products in accordance with manufacturer's instructions.
C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
D. Apply each coat to uniform appearance.
E. Sand wood and metal surfaces lightly between coats to achieve required finish.
F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FINISHING MECHANICAL & ELECTRICAL EQUIPMENT
A. Refer to Mechanical and Electrical specifications for painting, banding, stenciling of other surfaces / equipment, duct work, piping, and conduit.
1. Use existing hospital standards/ schedules for color coding of duct work, piping, and conduit as needed.
B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
C. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
D. Paint all equipment, including that which is factory-finished, exposed to weather or to view on roof and outdoors.
E. Paint shop-primed items occurring in finished areas.
F. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
G. Paint dampers exposed behind louvers, grilles, to match face panels.

3.5 RE-INSTALLATION
A. Re-install hardware, electrical equipment and cover plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
B. Reconnect equipment adjacent to surfaces indicated to receive coatings.
C. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
D. Remove protective materials.

3.6 PROTECTION & CLEANING

A. Protect all newly painted exterior surfaces from elements condensation and contamination until paint coatings are completely dry. Erect barriers or screens and post signs to warn of or limit or direct traffic.

B. Remove all spilled, splashed, splattered or over sprayed paint as work progresses, remove waste materials and keep area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from Site.

END OF SECTION

SECTION 09 91 02 INTERIOR PAINTING SCHEDULE

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Schedule of interior painting systems not specified elsewhere.

1.2 RELATED SECTIONS
A. Division 09 – FINISHES, INTERIOR FINISH SPECIFICATION: for selected colors.
B. Section 09 91 00 – PAINTINGS: for painting requirements.

1.3 SCHEDULE OF INTERIOR PAINTING SYSTEMS (PS)

PS-01: Interior Flat for Concrete, Gypsum Board & Service Jackets Over Insulation			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	UltraTech C152 low VOC primer, <6 g/l VOC 1.5 dft	UltraTech C129 interior flat, <6 g/l VOC 1.6 dft	UltraTech C129 interior flat, <6 g/l VOC 1.6 dft
Note: At all service jackets, add antifungal agent to primer to render fabric mildew resistant.			

PS-02: Interior Low Luster Eggshell for Concrete			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	UltraTech C251, Concrete primer, 50 g/l 2.1 dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft

PS-03: Interior Low Luster Eggshell for CMU			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	C302 UltraTech 100% Acrylic Block Filler, 6.3 mils dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft

PS-04: Interior Low Luster Eggshell for Plaster & Gypsum Board For General Use			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	C152 Interior Latex Multi-Solution Primer/Sealer, 1.1 mils dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft	4350 Klean Air Acrylic Eggshell Enamel, 1.6 mils dft

PS-05: Interior Satin for Plaster & Gypsum Board For Accent Walls			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	C152 Interior Latex Multi-Solution Primer/Sealer, 1.1 mils dft	4850 100% Acrylic Satin Enamel, 1.4 mils dft	4850 100% Acrylic Satin Enamel, 1.4 mils dft

PS-06: Interior Low Luster Eggshell for Exposed Overhead Work			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Finish Coat	
Parker	Comex C309 UltraTech Universal WB Metal Primer, 2.0 mils dft	UltraTech C-158 dry fall, 50 g/l VOC, 1.5 dft	None

PS-07: Interior Semi-Gloss Acrylic Enamel for Gypsum Board			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	C152 Interior Latex Multi-Solution Primer/Sealer, 1.1 mils dft	Wall Glow 3850 Interior Acrylic Semi-Gloss, 1.4 mils dft	Wall Glow 3850 Interior Acrylic Semi-Gloss, 1.4 mils dft

PS-08: Interior Opaque Semi-Gloss Acrylic Enamel for Wood			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	C312 UltraTech Interior/Exterior 100% Acrylic Wood Primer, 1.8 mils dft	Wall Glow 3850 Interior Acrylic Semi-Gloss, 1.4 mils dft	Wall Glow 3850 Interior Acrylic Semi-Gloss, 1.4 mils dft

PS-09: Interior Semi-Gloss Urethane Finish for Ferrous, Non-Ferrous, & Zinc-Coated Metals			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Intermediate Coat	Finish Coat
Parker	Comex E-10 High Solids Epoxy, 4.0 – 6.0 dft	Comex U-10, High Solids Polyurethane, 3.0 – 5.0 dft	Comex U-10, High Solids Polyurethane,3.0 – 5.0 dft

PS-10: Interior Satin Transparent Architectural Woodwork, Not Factory Finished, Closed Grain Woods			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Finish Coat	
Parker	Old masters Wiping Stain	Old Masters 75404 Satin W/B Polyurethane, 275 g/l VOC 1-2 dft	[---]

PS-11: Interior Semi Gloss Water Base Epoxy for Gypsum Board			
Approved Manufacturer	Approved Products/Coating Systems		
	Primer Coat	Finish Coat	
Parker	Ameron 335	Comex E-4100 WB Epoxy Semi Gloss	[---]

END OF SECTION

DIVISION 10 –SPECIALTIES

10 26 00 – WALL, DOOR AND CORNER PROTECTION

A. Section Includes:
   1. Corner guards.
   2. Wall Protection Sheet
   3. Crash guards

B. Submittals:
   1. Submit product data, samples, shop drawings.

C. Basis of Design Manufacturer:
   1. Inpro
   2. C-S Group - Acrovyn
   3. Substitutions: See Section 01 60 00 - Product Requirements.

D. Surface-Mounted, Metal Corner Guards: Material: Stainless-steel sheet, Type 304.Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition; in dimensions and profiles indicated Interior Finish Legend.
   1. Thickness: Minimum 0.0500 inch (1.3 mm).
   2. Finish: Directional satin, No. 4.
   3. Mounting: Adhesive.

E. Wall Protection Sheet - Surface Mounted:
   1. Standard Vinyl Material: High impact vinyl, color as selected from manufacturer's standard colors.
   2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   3. Sizes: As indicated Finish Legend.
   4. Thickness: 0.60 inches.
   5. Acceptable Products:
      a. Provide product indicated on Finish Legend.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

F. Crash Guards - Surface Mounted:
   1. Standard Vinyl Material: High impact vinyl on aluminum retainer, color as selected from manufacturer's standard colors.
   2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E 84.
   3. Sizes: As indicated in Finish Legend.
   4. Retainer Material Thickness: 0.80 inch.
   5. Provide with color-matched end caps.
   6. Acceptable Products:
      a. Provide product indicated on Finish Legend.
      b. Substitutions: See Section 01 60 00 – Product Requirements.

G. Installation: Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
   1. Coordinate installation of wall coverings with corner guard frame and cover.
   2. Provide vertical butt joints with color fill sealant. No trim.
   3. Provide clear sealant at top edge of wall protection. No trim.

10 28 00 - TOILET ROOM/KITCHEN ACCESSORIES

A. Section includes requirements for Owner Furnished/Contractor Installed (OFCI) and contractor Furnished/ Contractor Installed (CFCI) toilet and bath accessories.

B. Products: Refer to drawings.

C. Submittals:
   1. Submit product data, samples, shop drawings for CFCI accessories.

D. Installation:
   1. Install accessories in accordance with manufacturers' instructions in locations indicated.
   2. Install plumb and level, securely and rigidly anchored to substrate.
   3. Mounting Heights: As required by accessibility regulations, unless other indicated on Drawings.
   4. Use concealed fasteners wherever possible.
   5. Where exposed mounting devices and fasteners are necessary, provide such devices finished to match accessory; use security type fasteners for all exposed accessory mountings.
   6. Unless otherwise indicated, align accessory units with adjacent fixtures and other elements within the same area. Conform to ANSI/ICC A117.1 for positions and mounting heights.

10 44 00 FIRE PROTECTION SPECIALTIES

A. General:
   1. Provide Fire protection cabinets for the following:
      a. Portable fire extinguishers or Fire hose valves.
      b. Fire Extinguishers.

B. Submittals: Submit Product Data, Maintenance Data.

C. Quality Assurance: fire extinguishers and cabinets through one source from a single manufacturer.

D. Products:
   1. Fire Protection Cabinet: Recessed type, constructed of cold rolled steel with baked, black matte finish and sized to house fire extinguisher of types and capacities specified and as indicated on drawings. Weld joints and grind smooth. Miter and weld perimeter door frames.
      a. Trim less with hidden flange of same metal and finish as box (tub) that overlaps surrounding wall finish and is concealed from view by an overlapping door.
         i. Door: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.
         ii. Door Glazing: Clear float glass complying with ASTM C1036, Type I, Class 1, Quality q3.
         iii. Door Style: Manufacturer's standard design.
         iv. Door Hardware: Manufacturer’s standard door-operating hardware of proper type for cabinet type, trim style, and door material and style specified. Exposed doors pull and friction latch. Concealed continuous-type hinge permitting door to open 180 deg.
         v. Products: Larsens Manufacturing Company: Occult Series Fire Extinguisher Cabinets, Model O-2409 with vertical duo door or Potter-Roemer: Dana Series Fire Extinguisher Cabinets, 7220-DV or Camino Series Semi-recessed 1.5-inch trim with vertical duo door or comparable cabinets by Potter Roemer.
   2. Fire extinguisher: UL-rated 3A:40-B:C, 5-6 LB nominal capacity, with monoammonium phosphate-based dry chemical in enameled steel container.

E. Execution:
   1. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.
   2. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction. Fasten cabinets to structure, square and plumb.
   3. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.
   4. On completion of installation, clean interior and exterior surfaces as recommended by manufacturer.
   5. Place fire extinguishers in cabinets prior to Substantial Completion.

DIVISION 11 - EQUIPMENT

11 31 00- APPLIANCES

A. Sections include ice maker, water dispenser, refrigerator, dishwasher, kegerator.

B. Submittals:
   1. Submit product data, samples, shop drawings.

C. Electrical work in conjunction with food services equipment shall be fabricated and assembled in strict conformity with the requirements of the Underwriter's Laboratories, Inc., and shall provide under and over voltage protection.

D. Basis of Design: Provide products selected by Architect/Owner.
   1. Size: Manufacturer's standard.

E. Substitutions: Section 01 60 00 - Product Requirements.

11 40 00 - FOODSERVICE EQUIPMENT

Refer to Specifications and drawings provided by consultant.

DIVISION 12 - FURNISHINGS

12 36 00 – COUNTERTOPS

A. Fabricator Qualifications: Company specializing in the fabrication of specified countertops with a minimum of three years of documented experience.
   1. Same fabricator as for cabinets on which tops are to be installed where applicable.

B. Submittals:
   1. Submit product data, samples and shop drawings.

C. Delivery, Storage, and Handling: Comply with requirements of Section 06 40 00.

D. Countertops - General:
   1. Fabricate in accordance with manufacturer's standard requirements, and in accordance with same AWI or AWMAC/WI(NAAWS) grade as specified for cabinet on which countertop is to be installed.
   2. Edge Treatment and Other Features: As detailed or noted on Drawings.

E. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2-inch (12 mm) minimum unless otherwise indicated on drawings.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturer, Color, and Pattern: As scheduled on Drawings.
   3. Quartz Agglomerate: Solid sheet consisting of quartz aggregates bound together with matrix of filled plastic resin and complying with the “Physical Characteristics of Materials” Article of ANSI SS1.
      a. Manufacturer, Color, and Pattern: As schedule on Drawings.

F. Plastic-Laminate Countertops:
   1. Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops. AWI Custom Grade.
   2. High-Pressure Decorative Laminate Grade: HGS.
   3. Colors, Patterns, and Finishes: As scheduled.
   4. Edge Treatment: Same as laminate cladding on horizontal surfaces.
   5. Core Material: Particleboard or medium-density fiberboard.
   6. Core Material at Sinks: Particleboard made with exterior glue, medium-density fiberboard made with exterior glue, or exterior-grade plywood.
   7. Form countertops to 3/4" minimum thickness in one-piece lengths with integral OE adhesively bonded 1/2" thick Backsplashes.
   8. Form edges to profiles shown. Use 2 sheets of countertop sheet material laminated together using manufacturer’s standard adhesive to form edges. Laminated sections in close contact throughout. Adhesive stains are not permitted.

G. Fabrication:
   1. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
      a. Join lengths of tops using the best method recommended by manufacturer.
      b. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.
      c. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
   2. Provide back/end splash wherever counter edge abuts vertical surface at wet locations only or unless otherwise indicated on Drawings.
   3. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
   4. Wall-Mounted Counters:
      a. Provide skirts, aprons, brackets, and braces as indicated on Drawings, finished to match countertop unless otherwise indicated, particularly where under-cabinet lighting is specified.
      b. Provide concealed-in-wall metal brackets as shown on Drawings.
   5. Countertop Supports: Refer to Section 05 50 00 – Metal Fabrications.

H. Installation:
   1. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

2. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
    a. Align adjacent solid-surfacing-material countertops and form seams per manufacturer’s written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean the entire surface.
    b. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
    c. Caulk space between backsplash and wall with silicone sanitary sealant specified in Division 7 "Joint Sealants."