August 31, 2020

PROJECT SPECIFICATIONS

100% Construction Documents

Volume 1

Georgia Institute of Technology

Cherry Emerson Peter Yunker Lab Fit-Up

Second Floor- Rooms No. 230, 232

GT Project No.: 0360-2020
HERA Project No.: 20176.00

ARCHITECT
Laboratory Planner:
Health, Education & Research Associates, Inc.
Architect:
1447 Peachtree Street, NW Suite 880
Atlanta, GA 30309
Tel. 314.289.9202

MECHANICAL/ ELECTRICAL/ PLUMBING ENGINEER
Vanderweil
3260 Peachtree Street, NW
Atlanta, Georgia 30303
Tel: 617.556.9308

SIGNED BY:
NAME: CARLOS A. PEREZ-RUBIO
TITLE: ARCHITECT
COMPANY: HERA LABORATORY PLANNERS
ARCHITECT NO: 013675

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FOR MECHANICAL, ELECTRICAL, PLUMBING AND TELCOM SPECIFICATIONS REFER TO 100% CONSTRUCTION DRAWINGS DATED 08/31/2020

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SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's

letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fourteen (14) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fourteen (14) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within sixty (60) days after the Notice of Award.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

END OF SECTION 01 2500

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

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

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 DEFINITIONS

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

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

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

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

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

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

1.3 INFORMATIONAL SUBMITTALS

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

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

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

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

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

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

1.4 COORDINATION

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

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

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

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

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

1. Activity Duration: Define activities so no activity is longer than fourteen (14) days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 days, as separate activities in

schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

a. Laboratory Equipment

b. Laboratory Fume Hoods

c. Laboratory Casework

d. Mechanical Ventilation Equipment

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than fourteen (14) days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than fifteen (15) days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
2. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Limitations of continued occupancies.
c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use of premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work.

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

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

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

F. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within seven (7) days of date established for commencement of the Work. Outline significant construction activities for the first ninety (90) days of construction. Include skeleton diagram for the remainder of the work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a cost and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than thirty (30) days after date established for commencement of the Work.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.3 REPORTS

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

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.

13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At biweekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule seven (7) days before each regularly scheduled progress meeting.

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

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

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

END OF SECTION 01 3200

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule. Refer to Georgia Tech Yellow Book.
2. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals. Refer to Georgia Tech Yellow Book.
3. Section 01 001 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data. Refer to Georgia Tech Yellow Book.
4. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files in PDF format of the Contract Drawings for use in preparing Shop Drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow seven (7) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow seven (7) days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Name of subcontractor.
f. Name of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810
    b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

        1) Project name.
        2) Date.
        3) Destination (To:).
        4) Source (From:).
        5) Name and address of Architect.
        6) Name of Construction Manager.
        7) Name of Contractor.
        8) Name of firm or entity that prepared submittal.
        9) Names of subcontractor, manufacturer, and supplier.
        10) Category and type of submittal.
        11) Submittal purpose and description.
        12) Specification Section number and title.
        13) Specification paragraph number or drawing designation and generic name for each of multiple items.
        14) Drawing number and detail references, as appropriate.
        15) Indication of full or partial submittal.
        16) Transmittal number, numbered consecutively.
        17) Submittal and transmittal distribution record.
        18) Remarks.
        19) Signature of transmitter.

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return one copy.
2. Informational Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return one copy.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    a. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. Three paper copies of Product Data unless otherwise indicated. Architect will return one copy.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.

c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:
   a. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, will return one submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:
   a. Three paper copies of product schedule or list unless otherwise indicated. Architect will return one copy.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. LEED Submittals: Not Used.

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

V. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

W. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

X. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Y. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. "APPROVED": Submittal is in general conformance with the design concept of the Project and in general compliance with information given in the Contract Documents.
2. "APPROVED AS NOTED": Submittal has minor error. Noted corrections must be made in final installation. The Design Professional has option to require re-submission for record.
3. "REVISE AND RESUBMIT": Re-submission is required, due to nature or number of errors.
4. "REJECTED": Submittal does not meet contract requirements. Re-submittal is required.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 3300

SECTION 01 4000 QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing,

or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

D. Retesting/ Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule with Contractors Construction Schedule.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency and special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SUMMARY OF REVISIONS:

Rev.: Issue Date: Description:

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1. Section 01 2500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

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

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

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

1.3 ACTION SUBMITTALS

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

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within seven (7) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

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

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected. C. Storage:

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

1.6 PRODUCT WARRANTIES

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

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

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

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

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

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed

product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.

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

2.2 COMPARABLE PRODUCTS

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

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01 1000 "Summary" for limits on use of Project site.
2. Section 01 0001 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Section 07 8413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in

reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of concealed utilities and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect .

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Where conduit and piping is exposed, install piping in 90 degree horizontal or vertical direction and is secure to wall or adjacent sub structure.
5. Where multiple pipes or conduits are exposed, group and align piping so that they align 2” apart from each other from ceiling down to final location.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

SECTION 02 4119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 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: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1.4 CLOSEOUT SUBMITTALS

A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.6 FIELD CONDITIONS

A. 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 with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 01 0001 per the GA Tech Yellow Book.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 01 5000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. 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.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire wall portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 7419 "Construction Waste Management and Disposal."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. 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.

E. 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 a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be, reused, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. 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.

END OF SECTION 02 4119

SECTION 030100 - MAINTENANCE OF CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section specifies a single-component, polymer-modified, cementitious repair mortar and re-surfacer suitable for horizontal, vertical, and overhead applications.

B. Repair mortar: Designed for repairs (discrete confined zones) from featheredge to ½" in depth. This product may be extended up to 50 percent by weight to perform repairs up to 2" in depth.

C. Overlay system: Designed for horizontal overlays from featheredge to ½" maximum depth.

1.02 RELATED **SECTIONS**

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 03 0130 - Maintenance of Cast-In-Place Concrete.

1.03 REFERENCES

A. ACI 308: Recommended Practice for Curing Concrete.

B. ASTM C109 / C109M-16a: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

C. ASTM C191: Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.

D. ICRI Technical Guide No. 310.2-1997.

1.04 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

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

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

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

1.06 ENVIRONMENTAL REQUIREMENTS

A. Apply only when ambient and surface temperatures are 45° F (7.2° C) and rising.

B. Do not apply if the ambient temperature is expected to fall below 45° F (7.2° C) within 24 hours after placement.

C. Do not apply when rain is imminent.

D. Protect from conditions that may cause early water loss: high winds, low humidity, high temperature and direct sunlight.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: W. R. MEADOWS, INC., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Website www.wrmeadows.com.

Subject to compliance with requirements, cementitious product by the manufacturers below are also acceptable.

a. Sika Corporation, U.S., 201 Polito Avenue, Lyndhurst, NJ 07071, 1-800-933-SIKA

b. Mapei, Inc.

2.02 MATERIALS

A. Cementitious mortar: a single-component, polymer-modified, cementitious-based, overlay repair mortar suitable for horizontal, vertical and overhead applications.

1. Performance-Based Specification: The mortar shall be single-component, shrinkage compensating and shall be compatible with cementitious materials, brick, and block. Has waterproofing characteristics, which when cured, produces the following properties:

a. Compressive Strength (ASTM C109):
Minimum, 1 day: 2,500 psi (17.2 MPa)
28 day: 6,500 psi (44.8 MPa)

b. Set Times (ASTM C191):
Initial Set: 1 hour
Final Set: 2 hours

2. Proprietary-Based Specification:
a. SPECTRUM RE-KOTE TF by W. R. MEADOWS.

2.03 ACCESSORIES

A. Concrete Curing Compound:
a. 1100-CLEAR CURING COMPOUND, 2220-WHITE PIGMENTED CURING COMPOUND or VOCOMP®-30 CURING AND SEALING COMPOUND by W. R. MEADOWS INC.

B. Crack Repair Epoxy: REZI-WELD™ LV STATE by W. R. MEADOWS.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive cementitious mortar. Notify architect or engineer if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Prepare concrete substrate in accordance with ICRI Technical Guideline No. 310.2-1997.

B. Mechanically roughen concrete substrate to an ICRI surface profile of CSP-4 or higher using mechanical means or high pressure water-blast (minimum 5,000 psi)

C. Remove all unsound concrete to provide a profiled, porous surface.

D. Completely remove all dirt, grease, oil, toppings, coatings, topical penetrating treatments or any other deleterious materials.

E. Detail existing cracks, either by injecting or gravity feeding a low viscosity epoxy.

F. Saturate concrete substrate to a saturated, surface dry (SSD) condition, free of standing water.

3.03 MIXING

A. Pour 1.75 quarts of the recommended water into a clean mixing container.

B. Slowly add powder and mix using a mortar-type mixer to a desired consistency by using up the remaining water as recommended for the application type.

C. Mix for three minutes or until a lump-free and homogeneous consistency is obtained using a variable speed drill with a paddle mixer at 400-600 rpm.

D. Mix only enough material that can be placed and finished in 30 minutes at 77° F (25°C).

3.04 REPAIR MORTAR APPLICATION

A. Prime saturated, surface dry substrate with slurry coat of repair mortar consisting of two parts repair mortar to one part water.

B. Allow slurry coat to become tacky.

C. Apply repair mortar into repair zone substrate by compacting the material against the properly prepared and primed substrate.

D. Finish surface with steel or wood float, or sponge float.

E. Apply water-based curing compound immediately following application at manufacturer’s recommended coverage rates. Alternatively cure repair mortar in accordance with ACI 308.

3.05 CONCRETE RESURFACER APPLICATION

A. Apply a base-coat of the properly mixed and prepared surface either by a flexible blade, steel, wood float, or hopper sprayer, filling in the low or deteriorated areas.

B. Apply the base coat to a maximum depth of 1/2" and allow to dry prior to application of topcoat. Drying times are typically 2 - 6 hours depending on environmental conditions.

C. Proceed with placement of the topcoat may once the base-coat has dried, removing any high spots or rough areas of the base-coat using a rubbing stone.

D Ensure the base-coat has not been contaminated with dirt, oil, greases, paints, or any material that will hinder bonding of the topcoat. Clean areas that have been contaminated prior to proceeding.

E. Pre-dampen the base-coat and apply topcoat by flexible blade trowel or hopper sprayer to a uniform, smooth surface.

F. Broom the topcoat within 10 minutes of placement if a broom finish is required.

G. Apply a water based curing and sealing compound in two coats according to manufacturer's published instructions and coverage rates.

END OF SECTION 03 0100

SECTION 04 2200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's).

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

C. Samples: For each type of exposed masonry unit.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

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

a. ACM Chemistries, Inc.; RainBloc.
b. BASF Aktiengesellschaft; Rheopel Plus.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.

B. CMUs: ASTM C 90.
1. Density Classification: Normal weight unless otherwise indicated.

2.3 CONCRETE LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 033000 "Cast-in-Place Concrete," and with reinforcing bars indicated.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

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

a. Capital Materials Corporation

b. Lafarge North America Inc
c. National Cement Company, Inc

E. Mortar Cement: ASTM C 1329.

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

a. Lafarge North America Inc.; Lafarge Mortar Cement

F. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Water: Potable.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.25-inch- (6.35-mm-) diameter, hot-dip galvanized steel wire.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 01.05-inch- (2.66-mm-) thick, steel sheet, galvanized after fabrication.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.25-inch- (6.35-mm-) diameter, hot-dip galvanized steel wire.
3. Corrugated Metal Ties: Metal strips not less than 7/8 inch (22 mm) wide with corrugations having a wavelength of 0.3 to 0.5 inch (7.6 to 12.7 mm) and an amplitude of 0.06 to 0.10 inch (1.5 to 2.5 mm) made from 0.060-inch- (1.52-mm-) thick, steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch (25 mm) of masonry face.

D. Partition Top anchors: 0.105-inch- (2.66-mm-) thick metal plate with 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M

F. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.

B. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

PART 3 - EXECUTION

3.1 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).

2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.2 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.4 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.5 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

D. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

E. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.6 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch (19 mm).

B. Use a steel-trowel finish to produce a smooth, flat, dense surface. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.7 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.8 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess clean masonry waste as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal fabrications required but not specified elsewhere. Included are fabrications for mechanical and electrical work.
   2. Refer to Schedule at end of this Section, listing principal items only. Drawings may show work not scheduled.

1.2 ACTION SUBMITTALS

A. Shop drawings: For the following:
   1. Metal Framing to support overhead service Column

B. Framing to support track for the emergency shower curtain.Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
   1. Material: Galvanized steel, ASTM A 653/A 653M.
   2. Material: Cold-rolled steel, ASTM A 1008/A 1008M.

F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

G. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

I. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

J. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

K. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

L. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099123 Interior Painting.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.6 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

2.8 SLOTTED CHANNEL FURRING

A. Manufacturers: Subject to compliance with requirements, the following manufacturers and products named are acceptable; substitutions are permitted subject to Section 01630.

1. Unistrut, 35660 Clinton Street, Wayne, MI 48184 Tel: 800 521-7730.

2. Power Engineering Co. (Powerstrut), 420 Boston Turnpike, Shrewsbury, MA Tel: 800 274-1303.

3. Kumar Industries, 4881 Chino Ave., Chino, CA 91710 Tel: (909) 591-0722.

4. Cooper B-Line Inc. (B-Line), 509 West Monroe St., Highland, IL 62249 Tel: (618) 654-2184.

B. Materials: Channel and framing members shall be fabricated from steel conforming to the following requirements:

1. Framing Members:
   a. Concealed Framing Members and Fittings: ASTM A570 GR 33.
   b. Exposed Framing Members and Fittings: ASTM A653 GR A with zinc coating conforming to ASTM A653.
   c. Stainless Steel Framing Members and Fittings: ASTM A240 (Type 304), where indicated.

2. Fittings:
   a. Concealed Fittings: Fabricate from steel satisfying the requirements of ASTM A570 GR 33, and conform to the following ASTM specifications: A575, A576, A36, or A635. Nuts shall conform to ASTM A576 GR 1015 and screws shall conform to SAE J429 GR 2 and ASTM A307.
   b. Exposed Fittings: Fabricate from steel satisfying the requirements of ASTM A570 GR 33, and conform to the following ASTM specifications: A575, A576, A36, or A635. Nuts shall conform to ASTM A576 GR 1015 and screws shall conform to SAE J429 GR 2 and ASTM A307. Exposed fittings shall receive zinc coating conforming to ASTM A653.
   c. Stainless Steel Fittings and Hardware: Sintered Nuts shall be of ASTM B783 (Type 316N2-33) stainless steel and fittings shall be of ASTM A240 (Type 304) stainless steel. Stainless steel fittings and hardware shall be used with stainless steel framing members, or where indicated.

2.9 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.10 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

2.11 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600.
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 078413 - FIRESTOPPING PENETRATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Provide firestop systems consisting of a material, or combination of materials, installed to retain the integrity of fire-resistance-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-resistance-rated barriers in accordance with the requirements of the Life Safety Code for this project.

B. Firestop systems shall be used in locations including, but not limited to, the following:

1. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain penetrations.
2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.
4. Joints in fire-resistance-rated assemblies to allow independent movement.
5. Perimeter Fire Barrier System between a rated floor/roof and an exterior wall assembly.
6. Joints, through penetrations and membrane penetrations in Smoke Barriers and Smoke Partitions.

C. Related Sections include the following:

1. Division 22 and 23 Sections specifying duct and piping penetrations. Specifications provided on MEP drawings

2. Division 26, 27, and 28 Sections specifying cable and conduit penetrations. Specifications provided on MEP drawings

D. References

ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM E 814	Fire Tests of Through Penetration Firestops
ASTM E 2174	Standard Practice for On-Site Inspection of Installed Fire Stops
ASTM E 2393	Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems

ASTM E 2307	Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus
UL 1479	Fire Tests of Through-Penetration Firestop Systems
UL 2079	Tests for Fire Resistance of Building Joint Systems

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including empty openings and openings containing penetrating items as well as membrane penetrations, provide firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. All requirements for firestop systems as found in NFPA 101 (Life Safety Code) shall be adhered to.

1. Where NFPA 101 exempts penetrations from requiring firestopping, such as filling annular space around non-metallic penetrations with grout or mortar, the exemption shall apply and not be subject to the firestopping provisions found in this Specification Section.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:

1. F-Rated Systems: Provide penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For penetrations through floors located outside wall cavities or fire-resistance-rated shaft enclosures, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings.

C. Perimeter Fire Barrier Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, as determined per ASTM E 2307, but not less than the fire-resistance rating of the floor construction.

D. Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079, but not less than the fire-resistance rating of the construction in which the joint occurs.

E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations of plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 100 mm (4 in.) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

F. Firestop Materials for Specific Conditions

1. Cabling for data and communication applications shall be sealed with re-enterable firestopping products. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants. Each device must be capable of retrofit applications. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials.

    a. Pillow/brick type materials are allowed for any data/communications firestop application.

1.4 SUBMITTALS

A. The contractor shall provide the following submittals to the project officer for review by the NIH Division of the Fire Marshal:

1. Manufacturer Product Data Sheet: For each type of product indicated.
2. Shop Drawings: For each firestop system, show each type of construction condition penetrated, relationships to adjoining construction and type of penetrating item. Include firestop design designation, including the assembly number, of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

    a. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop system configuration for construction and penetrating items.
    b. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

3. Qualification data showing compliance with Quality Assurance article:

    a. For Installer.
    b. For independent inspecting agency.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm experienced in installing firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Independent Inspecting Agency: Same as Installer Qualifications above, except substitute “inspect” for “install”.

1. International Accreditation Service’s Accreditation Criteria 291 (IAS AC291) may be substituted for 1.5.A.1 above for Inspecting Agency.

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

D. Product Characteristics: Provide firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is an agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install firestop systems when ambient or substrate temperatures are outside limits permitted by firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate firestop systems per manufacturer's instructions or Safety Data Sheet.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestop systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Systems listed by approved testing agencies, as identified in part 1 above, may be used, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance.

2.2 FIRESTOPPING, GENERAL

A. Systems listed by approved testing agencies, as identified in part 1 above, may be used, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance.

B. Compatibility: Provide firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating penetration firestop systems, under conditions of service and application, as demonstrated by firestop system manufacturer based on testing and field experience.

C. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

a. Slag-/rock-wool-fiber insulation.
b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fire-rated form board.
d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

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

3.2 MIXING

A. For those products requiring mixing before application, comply with firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

3.3 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.4 PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 FIRESTOP JOINT SYSTEMS INSTALLATION

A. General: Comply with the "System Performance Requirements" article in Part 1 and with the firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

1. Install joint forming materials to provide support of firestop materials during application and at the position required to produce the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

B. Install tested and listed, classified systems and non-tested engineering judgments, EFRRA's that result in firestop materials:

1. Directly contacting and fully wetting joint substrates.
2. Completely filling recesses provided for each joint configuration,
3. Providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability and meet tested and listed system requirements.

C. Tool non-sag firestop materials immediately after their application and prior to the time skinning or begins. Form smooth, uniform beads of configuration indicated or required to:

1. Produce fire-resistance rating
2. Eliminate air pockets
3. Ensure contact and adhesion with sides of joint

3.6 PERIMETER FIRE BARRIER SYSTEM INSTALLATION

A. General: Comply with "System Performance Requirements" article in Part 1 and with the firestop manufacture's installation and drawings pertaining to products and applications indicated.

B. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and other firestop system components as applicable within the system design.

3.7 FIELD QUALITY CONTROL

A. Engage a qualified, independent inspecting agency to inspect firestopping. Independent inspecting agency shall comply with ASTM E 2174 or ASTM E 2393 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Enclose firestop systems with other construction only after inspection and acceptance by the NIH Division of the Fire Marshal and independent inspecting agency. If the firestopping will remain exposed then it can be inspected as part of the final acceptance (pre-occupancy) inspection performed by the NIH Division of the Fire Marshal.

1. Inspection may include destructive demolition according to ASTM E 2174 or ASTM E 2393.

C. Where deficiencies are found or a destructive demolition for inspection occurred, repair or replace firestop systems so they comply with requirements.

3.8 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 07 9200 – LABORATORY JOINT SEALANT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Architectural Urethane Joint Sealant ASTM C920 (JS-1)
2. Mildew-resistant joint sealants. - 100% Silicone. ASTM C920 (JS-2)
3. Siliconized Acrylic Latex ASTM C834 (JS-3)
4. Non-Halogenated Latex-Based Elastomeric Sealant ASTM C920 (JS-4)

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS – Submit for approval by Architect.

A. Product Data: For each joint-sealant product.

B. Sealant Installation Execution Plan: The Execution Plan shall indicate the responsible party for installing all sealants, including their experience and qualifications.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 MOCK-UP

A. Sealant mock-up shall be constructed for approval of by architect and client. The mock-up shall include all typical conditions and materials, and shall remain in place as a basis of comparison and approval of the final installation. The mockup shall be in the same room identified in the Resinous flooring specification.

B. Sealant of plates, escutcheons and similar items can be bedded or bead at perimeter.

C. Sealant must be full coverage without gaps or voids. Sealant must be applied in an even and professional manner, without drips or excessive material. Previously sealed items shall be cleaned of old sealant and properly prepared for resealing. Sealant cannot adversely affect the operation of sprinklers or other devices. Sealant shall be installed following the manufacturer’s recommended methods and details.

D. Mock-up will comply with the requirements of the attached: Joint Sealant Table.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content: Sealants and sealant primers shall comply with the following:

1. Architectural sealants and sealant primers shall have a VOC content of 250 g/L or less.

B. Colors of Exposed Joint Sealants: White.

2.2 ARCHITECTURAL URETHANE SEALANT (JOINT SEALANT TYPE JS-1)

A. Urethane sealant ASTM 920, Color: White;

2.3 MILDEW-RESISTANT JOINT SEALANTS (JOINT SEALANT TYPE JS-2)

A. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT, G, and A.

1. For use when sealing toilets, sink faucets and other plumbing fixtures, and in areas subject to standing water and dampness.

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

a. Dow Corning Corporation.

b. Sika Corporation.
c. Pecora Corporation.
d. Tremco Incorporated.

2.4 LATEX JOINT SEALANTS (JOINT SEALANT TYPE JS-3)

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Latex plus silicone is not an acceptable product.

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

a. Sika Corporation.
b. Pecora Corporation.
c. Sherwin-Williams Company (The).
d. Tremco Incorporated.

2.5 NON-HALOGENATED LATEX-BASED ELASTOMERIC SEALANT ASTM C920 (JOINT SEALANT TYPE JS-4)

A. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT, G, and A.

1. Designed to provide passive smoke and fire protection in construction joints. This material is also designed to restore sound attenuation properties to sound-rated ceilings and partitions.

2. The fire protective sealant shall be a water-based, non-halogenated, elastomeric and shall contain no solvents, inorganic fibers, nor asbestos. The sealant shall dry to form a flexible, moisture resistant seal and shall adhere to all common construction surfaces. The sealant shall have demonstrated sound attenuation properties.

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

a. Dow Corning Corporation.
b. Sika Corporation.
c. Pecora Corporation.
d. Tremco Incorporated.

2.6 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining, compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

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

    a. Alcot Plastics Ltd.
    b. BASF Corporation; Construction Systems.
    c. Construction Foam Products; a division of Nomaco, Inc.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
3. Clean porous joints substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 JOINT-SEALANT SCHEDULE:

A. Joint-Sealant Application: Refer to the attached Joint Sealant Table. Note, all sealant installation in Laboratories spaces (BSL 2) shall be smooth, continuous sealed and pin-hole free. No ledges or crevices shall be created that would allow bacteria and mold to grow. All exposed sealant must be cleanable.

B. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

C. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

D. Refer to JOINT SEALANT Table attached on following pages.

END OF SECTION 07 9200

Group	Description	BSL-2 Sealants	Comments
Doors	Seal all penetrations in doors	N/S	
	Seal all door hinge plates (nor at pin) to include piano hinges	N/S	
	Seal door frame and wall board int reface	JS -3	
	Seal view panel frames (around Nd glass whether gasketed)	N/S	Interior and exterior sides
	Seal around lock sets	N/S	Seal between escutcheon plates and door
	Seal around all sides of larch boxes installed within frames	N/S	
	Seal door thresholds to the floor and around the threshold	JS-1	
	Seal door protection plates and tapered door guards to doors	N/S	
	Seal gaps around door magnet larch at head of door and frame	N/S	
Cabinetry/ Shelving	Seal openings in the base of rabies where the support feet mount to the table	JS-3	
	Seal openings in table legs where the support feet mount to the floor	JS-3	
	Seal all cabinets where they contact dissimilar materials and where they contact one another	JS-1 or 3..	Cabinets need to be closed boxes. Seal all voids and joints in cabinet construction. Seal all removable panels.
	Seal all counter tops where they c on tact with dissimilar material	JS-1 or 3°	Depends on finish.
	Sea l around all shelf support brackets where they contact the shelves and a re mounted to the walls	N/S	This is for specialty shelving used in laboratories.
	Seal tops and bottoms of all wall mount ed shelving brackets	JS -3	A plug shall be sealed.
	Seal all gaps and openings in racks	N/S	For ABSL-3 equipment, typically stainless-steel racks in aquatic rooms.
	Seal covers between shelf standards	JS-I or3 ...	
	Seal peninsula shelving support at countertop and at ceiling	JS- I or 2..	
Walls/ Floors/ Ceilings	Seal around all wall guards, bumpers, and rails	JS-3	Brackets/fasteners shall be installed right to wall.
	Seal all penetrations on the top and bottom of slab	JS-4	To include but not limited to HVAC, plumbing, and electrical penetrations, and like penetrations through interstitial space.
	Seal around all corner guards	JS-3	Brackets/ fasteners shall be installed right to wall.
	Seal around all door bumpers	N/S	Brackets/fasteners shall be installed right to wall.
	Seal top of trim strip and sheet flooring at wall	N/S	
	Seal top of cove base	JS-I	
	Seal bottom of cove base	JS-1	Integral base required in BSL-3, ABSL-3 and ABSL-2
	Seal all ceiling access panels (whether 100% gasketed)	N/S	
	Seal the perimeter of all suspended acoustical or FRP ceiling frames a t the wall juncture	JS-3	
	Seal all interior window frames (including gasketed areas)	JS -2	Sealant shall be sloped to promote cleaning. Seal all joints, including stops, juncture to glass and screw heads

Group	Description	BSL-2 Sealants	Comments
Walls/ Floors/ Ceilings (continued)	Seal around wall and ceiling, surface-mounted cover plates and surface-mounted mounting plates	JS-1 or 3••	This applies to exposed mounted brackets. The use of sealant at these brackets is as follows: 1) If the bracket or wall mounted fixture is easily removable, then sealant is not required, 2) If the brackets are permanently affixed to wall, then joints shall be sealed. Each bracket shall be examined for requirement of seal ant on a case by case basis.
	Seal all around floor surface-mounted mounting plates	JS-I	This applies to exposed mounted brackets. The use of seal at these brackets is as follows: I) If the bracket or floor mounted fixture is easily removable, then sealant is not required, 2) If the brackets arc permanently affixed to door, then joints shall be sealed. Each bracket shall be examined for requirement of sea l on a case by case basis.
	Seal all around floor surface-mounted cover plates	JS-1	
	Seal and cap the tops of all CMU walls	NIA	AH Research Facilities' CMU walls shall be capped with cap block. Seal penetrations of cap block with JS-3
	Seal control joints in walls	JS-1	
	Seal control joints in ceilings	JS-1	
	Seal control joints in floors	JS-1	Not visible to room - beneath floor. Use sealants recommenced by flooring manufacturer under resinous floors
	Seal joints between walls of dissimilar materials	JS-3...	
	Seal space in wall penetrations, including inside sleeves, collars, and surrounding construction	JS-4	Where stuff mineral wool is applied, use fire stop and spray over with JS-4.
HVAC	Seal all duct work that penetrates the wall envelope	JS-3	
	Seal all diffusers/grill joints in hard ceilings	JS-3	
Plumbing	Hot water line insulation shall be wrapped in aluminum and the seams and ends of the insulation sealed	JS-2	This applies for steam lines (e.g., autoclaves).
	Seal a vacuum pass through	JS-3	
	Seal all cracks in foam rubber water line insulation	JS-3	
	All flat escutcheon plates and support standoff brackets for automatic watering systems shall be sealed all around	JS -3	
	Seal plumbing to surface	JS-3	
	Seal all plumbing escutcheon and cover plate s at the wall and pipe junctions	JS-3	
	Seal around sprinkler collars	JS-3	Seal inside and outside of collar. Confirm that sealant does not interfere with sprinkler operation.
	Seal all piping that penetrates the wall envelope	JS-3	
Electrical	Conduit and raceway shall be sealed tight to wall or ceiling surfaces	JS-3	Sealant is required on both sides of surface mounted conduit and raceway.

Group	Description	BSL-2 Sealants	Comments
Electrical (continued)	Seal the perimeter of all electrical panels	N/S	Panelboards in BSL-2 spaces do not require sealing - if done, recommend with gasket only. Locating panelboards within ABSL area s shall be avoided and shall never be placed in actual BSL-3 space. If required within ABSL space, gasketing and sealing is required. Sealing of cover plates in SL-2 is not required.
	Seal joints between ceiling and light fixtures in hard ceilings	N/S	Surface and recessed mounted lighting fixtures shall have sealant applied between fixture enclosure and ceiling surface. Recessed mounted fixtures shall have manufacturer's gasketing applied between fixture lens trim cover and adjacent ceiling surfaces.
	Seal peri meter of device boxes t0 adjacent drywall/CMU. Wire within conduit shall be sealed also.	N/S	Applicable for ALL power, communications, signal and control applications within ABSL-2 facilities: All device boxes shall be cast type with external hub. Where device boxes and conduits are recessed mounted, the box to the adjacent wall, ceiling or floor surface shall be scaled. All wiring shall be provided in either threaded rigid galvanized steel (RGS), intermediate metal conduit (IMC), or electrical metallic tubing (EMT - only when recessed and with compression fittings). Gasketed devise cover plates shall be used, with an additional continuous bead of silicone sealant between the device box cover plate and the adjacent wall, ceiling or floor surface. Where device boxes and conduits are surface mounted, and where the device box meets the wall, ceiling, or floor surface, a continuous - bead of silicone sealant shall be provided. Non-recessed conduits are then required to be threaded RGS on minimum 19 mm (3/4 in) standoffs, or if also surface mounted, both sides of the conduit shall be sealed to adjacent surfaces with silicone caulk. Once wiring is installed, the wiring shall be surrounded by a one inch-barrier of silicone caulking around the conduct0rs within the device box hub. This prevents vermin harbor - age in and transmission through the electrical distribution systems.
Electrical (continued)	Seal perimeter of device boxes to adjacent drywall/C M U. Wire within conduit shall be sealed also.	•N/S	Applicable for ALL power, communications, signal and control application s within ABSL-3 and BSL-3 laboratory facilities: All device boxes shall be cast type with external hub. Where device boxes and conduits are recessed mounted, the box to the adjacent wall, ceiling or floor surface shall be sealed. All wiring shall be provided in either threaded rigid galvanized steel (RGS) or intermediate metal conduit (IMC - only when recessed). Casketed device cover plates shall be used, with an additional continuo us bead of silicone caulk between the device box cover plate and the adjacent wall, ceiling or floor surface. \'(/h ere device boxes and conduits are surface mounted, and where the device box meets the wall, ceiling, or floor surface, a continuous bead of silicone seal - ant shall be provided. Non-recessed conduits are then required to be threaded RGS on minimum ¾" (19 mm) standoffs, or if also surface mounted, both sides of the conduit shall be sealed to adjacent surfaces with silicone sealant. Once wiring is installed, the wiring shall be surrounded by a one-inch barrierr of silicone caulking around the conductors within the de vice box hub. This provides for a gas-tight electrical installation allowing decontamination of the BL3 space, and prevents vermin harborage in the BL3 space, and prevents vermin harborage in and transmission through the electrical distribution systems.

Group	Description	BSL-2 Sealants	Comments
Equipment (continued)	Seal all fixed equipment that is within 38 mm or less from a ceiling	JS-1	
	All sinks shall be sealed if they contact other surfaces, including mounting and support brackets	JS- I	
	Large gaps, behind the back splash shall filled in with foam and sealed in place.	JS-3	
	Seal all gaps and openings in secured/fixed equipment	N/S	May hinder function of equipment - Review on a case-by-case basis.
	Seal gaps that exist between stainless steel sheet metal in all cage washers	JS-2	
	Seal gaps that exist between stainless steel sheet metal in all runnel washers	JS-2	
	Seal gaps that exist between stainless steel sheet metal in all rack wash equipment	JS-2	
	Seal around frames and holes inside of fire extinguisher boxes	JS-2	Some doors have hollow channel in access doors. Seal access door frame channels and glass cover where no clips are present.
	Seal around the meta l rod hangers used to hold the exhaust hood s where they penetrate the drop ceiling	JS - I or 2	
	Seal wall mounted heating/air conditioner unit casework and utility penetrations	JS-3	
	Seal floor mounted equipment supports, legs and standoff supports	JS-1	
Fixtures	Seal stainless steel equipment at all joints and gaps	JS-2	
	Seal toilet mounted to surface	JS-2	
	Sea l sink faucet mounted to surface	JS-2	
	Seal wall hung equipment at surface attachment	JS-2	

SECTION 081113 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

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

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

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

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Karpen Steel Custom Doors & Frames.
   3. Steelcraft; an Ingersoll-Rand company.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

A. Standard-Duty Doors and Frames: SDI A250.8, Level 1

1. Physical Performance: Level C according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.

3. Frames:

    a. Type: As indicated in the Door and Frame Schedule.

4. Exposed Finish: Factory.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

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

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

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

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

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 088000 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches (1524 mm) high.

2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

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

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

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

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

2.7 STEEL FINISHES

A. Factory Finish: SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range

2.8 ACCESSORIES

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

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

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

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

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.

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

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. In-Place Metal Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

2.2 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: As indicated on Drawings
2. Depth: As indicated on Drawings

B. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Dietrich Metal Framing;

2) MBA Building Supplies;
3) Steel Network Inc. (The);

C. Firestop Tracks: Manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

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

a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: As indicated on Drawings

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: As indicated on Drawings
2. Depth: As indicated on Drawings

G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: hat shaped.

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Capable of sustaining a load equal to [5] <Insert number> times that imposed as determined by ASTM E 488.

2. Powder-Actuated Fasteners: Capable of sustaining, a load equal to ten (10) times that imposed as determined by ASTM E 1190.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings

2.4 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
5. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counters playing, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
3. Do not attach hangers to steel roof deck.

4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 2216

SECTION 09 2900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

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

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. National Gypsum Company.
5. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (12.7 mm).
2. Long Edges: Tapered

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

E. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc or Plastic

B. Aluminum Trim: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.5 AUXILIARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

D. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

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

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation; AC-20 FTR
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
e. USG Corporation; SHEETROCK Acoustical Sealant.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings
2. Control Joints: Install control joints at locations indicated on Drawings

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3. Level 5:

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 2900

SECTION 09 5100 – ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical tile and concealed suspension system for ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP.

B. Mockups: Build mockups to verify selections made under sample submittals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

B. Stain-Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A

2.2 ACOUSTICAL TILE CEILING, GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL CEILING (ACT-1)

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

B. Basis-of-Design Product: Armstrong World Industries, Inc. Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. CertainTeed Corp.
2. USG Interiors, Inc.; Subsidiary of USG Corporation.

C. Acoustical Panels: Acceptable Product: Ultima, Beveled Tegular Tile, 1911 as manufactured by Armstrong World Industries.

1. Surface Texture: Medium.
2. Composition: Mineral Fiber.
3. Color: White.
4. Size: 24in x 24in x 3/4 in.
5. Edge Profile: Square Lay-In for interface with Prelude XL 15/16 inch Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.75.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35.
8. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton N/A.
9. Flame Spread: ASTM E 1264; Class A (UL)
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.88.
11. Dimensional Stability: Standard.

D. Suspension System: Acceptable Product: Prelude XL 15/16 inch Exposed Tee as manufactured by Armstrong World Industries, Inc.

1. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching.
   a. Structural Classification: ASTM C 635 Intermediate Duty.
   b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
2. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
3. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least three times design load, but not less than 12 gauge.

4. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical tile ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

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

C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

END OF SECTION 09 5100

SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 RUBBER BASE (RB-1)

A. Manufacturers: Basis of Design Manufacturer Johnsonite. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

C. Thickness: 0.125 inch

D. Height: Refer to Finish schedule, refer to sheet QL-202

E. Lengths: Provide coil wall base in manufacturer's standard length.
   a. Provide cove with toe for resilient vinyl and rubber flooring.

F. Outside Corners: Preformed

G. Inside Corners: Preformed

H. Colors: Refer to Finish Schedule, QL-202

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners: Not allowed

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.

1. Apply two coat(s).

C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 6513

SECTION 09 6519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

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

2.2 VINYL COMPOSITION FLOOR TILE (VCT-1)

A. Products: Basis of Design manufacturer is Armstrong World Industries, Inc. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   1. Tarkett Inc.
   2. Mannington Mills, Inc;

B. Tile Standard: ASTM F 1066,

C. Thickness: 0.125 inch (3.2 mm)

D. Size: 12 by 12 inches (305 by 305 mm).

E. Colors and Patterns: Refer to finish schedule on sheet QL-202.

F. Performance Characteristics:
1. Static Load Limit: 0.002 maximum indentation, ASTM F 970-00, at 3000 psi and temperature at 23 degrees C., 50 percent R.H.
2. Specific Density of Smoke Generated: 268.9 avg Dmc, ASTM E-662, test orientation – face to furnace.
3. Static Coefficient of Friction: 0.69 wet and 0.44 dry, 73 degrees F., 50 percent R.H.
4. Resistance to Chemicals: no change surface attack, slight change color change, slight change surface dulling.
5. Abrasion Resistance: Maximum 0.0633 gm weight loss, ASTM F510, leather wheels, 1000 gm load at 2000 cycles.
6. Impact Resistance: No cracks beyond limits with 0.143 lbs ball weight dropped from 20 inches.
7. Dimensional Stability: 0.000 in. ft. when tested at 82 degrees C. for 6 hours and then back to room temperature.
8. Deflection: Less than 2 inches in both machine and cross machine direction with a crosshead speed of 4 in/min and chart speed 10 in/min on an 8 inch span.
9. Heat Resistance: 1.97 average, when tested for 7 days at 158 degrees F. (70 degrees C.)
10. Water Absorption: 0.3 average.
11. Hardness: Not less than 74, as measured using Shore, Type D durometer per ASTM D 2240.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring 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.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
1. Apply temporary finish protection until Substantial Completion, in accordance with manufacturer’s written recommendations for each type of material installed

END OF SECTION 09 6519

SECTION 09 9110 - ELECTROSTATICALLY APPLIED COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of electrostatically applied coating is indicated on Drawings, schedules and by provisions of this Section.

B. Type of electrostatically applied coating includes field application of electrostatically charged, sprayed paint coating, over metal elevator doors and frames.

C. Colors: Color selection process is as follows:

1. Color selections are included in "Schedule" article of this Section.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's literature including descriptive data and recommendations for mixing, application, and curing.

B. Samples for Initial Selection: Manufacturer's color sample to match color indicated on drawings (matching existing colors of items to receive electrostatically-applied coating).

C. Samples for Verification: Two cards, not less than 3-inches by 5- inches, of actual paint sample of selected color. Provide additional card sets for each separate color.

1.3 QUALITY ASSURANCE

A. Provide written certification attesting that applicators have been factory trained, and that application equipment used complies with manufacturer's requirements.

1.4 DELIVERY AND STORAGE

A. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name, trade name, and label analysis. Store materials in protected area at a temperature not less than 50F and in accordance with other manufacturer's instructions.

1.5 JOB CONDITIONS

A. Apply coatings only when environmental temperature can be maintained above 50 deg. F. during application and drying period.

B. Provide work areas free of excessive dust. And with illumination adequate to apply special coatings.

PART 2 - PRODUCTS

2.1 ELECTROSTATICALLY APPLIED COATING (PT-2)

A. Manufacturer: Provide products of company with demonstrated experience in manufacturing coatings intended for electrostatic application.

2.2 MATERIALS

A. General: Provide coatings specifically compounded by manufacturer for electrostatic spray application. Where primers are indicated or required, provide only primers that are approved by manufacturer for use with finish coating materials.

B. Material Quality: Materials which do not display Manufacturer's identification will not be acceptable.

C. Mix, prepare, and store materials according to Manufacturer's latest printed instructions. Manually mix coating materials; power mixing devices are not permitted. Do not add thinner or other agents to coating materials.

D. Color: Provide color as follows:
1. Match selection indicated on finish schedule on sheet QL-202

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine surfaces to be coated and report any conditions that would adversely affect the appearance or performance of the coating systems and which cannot be put into an acceptable condition by specified preparation.

B. Do not proceed with surface preparation and application until the surface is acceptable or authorization to proceed is given by the Architect.

3.2 PREPARATION

A. Protect work of other trades and adjacent surfaces not scheduled to be coated. Prepare and clean in strict accordance with coating manufacturer's instructions.

B. Sand, or chemically clean as appropriate, all abraded surfaces, corroded areas and other imperfections in surfaces to be coated. Fill or feather edges of sanded areas to produce for a smooth transition to bare metal.

3.3 APPLICATION

A. Apply prime and finish materials in accordance with manufacturer's directions. Apply each material at not less that the manufacturer’s recommended spreading rate. Use special equipment, applicators, and techniques recommended by manufacturer as best suited for the particular applications.

B. Apply additional coats beyond scheduled requirements when undercoating, stains or other conditions show through final paint coat until the special coating is of uniform finish, color and appearance.

3.4 CLEANING

A. Remove paint spatters from any adjoining surfaces. Repair any damage to coatings or surface caused by cleaning operations.

B. Remove debris from job site and leave area clean.

3.5 SCHEDULE OF SURFACES TO BE COATED

A. All Existing fixed Casework: Prepare and coat each of the following surfaces:
   1. Surfaces exposed to view in existing construction, including all edges of doors and drawer fronts, regardless of exposure condition.
      a. Color: Selection indicated on finish schedule on sheet QL-202

   2. Interior surfaces of cabinet drawers and doors, and sides, back and bottom of cabinet shell.
      a. Color: Selection indicated on finish schedule on sheet QL-202

B. Existing Fume hood: Prepare and coat each of the following surfaces:
   1. Surfaces exposed to view in existing construction, including all edges of panels, regardless of exposure condition.
      a. Color: Selection indicated on finish schedule on sheet QL-202

END OF SECTION 09 9110

SECTION 09 9123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Field painting and finishing of each and every exposed surface on the Project, except, the following surfaces do not require field painting unless scheduled:

1. Areas scheduled "unpainted", except woodwork, ungalvanized metal or unprimed metal therein.
2. Stainless steel, brass, bronze, copper or aluminum; except mill finish aluminum.
3. Joint sealers except acrylic latex.
4. Acoustical ceilings including suspension system.
5. Valves, controls, and sprinkler heads.
6. Name plates on equipment.
7. Copper or stainless steel pipe. Paint all exposed and concealed pipe.
8. Exposed Pipe shall mean pipe open to view in the completed construction.
9. Concealed Pipe shall mean pipe within floors, walls and above finished ceilings not open to view in the completed construction.
10. Finish hardware except lacquered door closers and other hardware with USP finish.
11. Glass, tile, plastic, plastic laminate or flooring.
12. Light fixtures.
13. Galvanized metal gratings.
14. Items with factory finish (not primer paint), except as specified to receive additional field applied finish coats.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of paint system and in each color and gloss of topcoat.

C. Product List: For each product indicated. Include printout of current "Master Painter's Institute (MPI) Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 INTERIOR PAINT (PT-1 and PT-3)

A. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

1. Basis of Design: Sherwin Williams

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.

D. Colors: Refer to Finish schedule on sheet QL-202

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

B. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

C. Primer, Bonding, Water Based: MPI #17.

2.5 WATER-BASED PAINTS

A. Latex, Interior, (Gloss Level 2): MPI #44.

B. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.

C. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2): MPI #144.

D. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.

2. Latex over Latex Aggregate System:

a. Prime Coat: Textured coating, latex, flat, MPI #42.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2), MPI #144.

B. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.

C. Gypsum Board:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.

2. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79.
b. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.

c. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79 or primer, alkyd, quick dry, for metal, MPI #76.
d. Prime Coat: Shop primer specified in Section where substrate is specified.
e. Intermediate Coat: Aluminum paint, MPI #1.
f. Topcoat: Aluminum paint, MPI #1.

D. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

a. Prime Coat: Primer, galvanized, water based, MPI #134.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.
e. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
f. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

2. Water-Based Dry-Fall System:

a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1), MPI #133.
b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1), MPI #133.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, galvanized, water based, MPI #134.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1), MPI #143.
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2), MPI #144.
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145.
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

END OF SECTION 09 9123

SECTION 10 2123 – BLACK OUT CURTAINS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Black out curtain tracks and carriers.

1.02 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including durability, fade resistance, and fire-test-response characteristics for each type of curtain fabric specified.

C. Shop Drawings showing layout and types of cubicles, size of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.

D. Coordination Drawings for reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show the following: Ceiling suspension assembly members.

E. Samples for verification of the following products, showing the full range of color, texture, and pattern variations expected.
   1. Curtain Track: Manufacturer's standard-size unit, not less than 4 inches long.
   2. Curtain Carrier: Manufacturer's full-size unit.

F. Product certificates signed by manufacturers of curtains and tracks certifying that their products comply with specified requirements.

G. Maintenance data for cubicle tracks and curtains to include in the operation and maintenance manual specified in Division 1.

1.03 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify that tracks and curtains may be installed to comply with the original design and referenced standard.

B. Space Enclosure and Environmental Limitations: Do not install tracks and curtains until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, and work above ceilings is complete.

1.04 EXTRA MATERIALS

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

1. Curtain Carriers and Track End Caps: Before installation begins, furnish quantity of full-size units equal to 3 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Manufacturer: Subject to compliance with requirements, provide curtains by the following:

1. Kentek Cooperation.; Blockout curtain,
   a. 32 Broadway Street
      Pittsfield, NH 03263
      USA
      Toll free: 1-800-432-2323

2. Blackout Curtains
   a. 8527 Westmoreland, Suite 111
      Minneapolis, Minnesota 55426

3. Brinte Inc
   a. 270 Centre St. Unit F
      Holbrook, MA 02343

2.02 ROLLER RAIL TRACK

A. Track: Steel track system comprised of straight pieces, curves, end stops, by-pass rails and connectors.

1. Track: Factory fabricated with engineered channel to ensure smooth and directional operation of roller system; not less than 12-inch-radius bends.
2. Connector: Of same material and finish as track.
3. Finish: stainless steel.

B. Track Mounting: Ceiling mounted; mechanically fastened to suspended ceiling grid.

1. Exposed Fasteners: Stainless steel.
2. Concealed Fasteners: Stainless steel.

C. Blackout Curtains: Existing blackout Curtains shall be relocated to labs in Cherry Emmerson Building.

1. Provide new Velcro strips along existing curtains for attachment to wall and existing panels. Refer to plans
2. Provide new blackout curtains with valances to match existing where indicated on lab drawings.

C. Accessories: Provide end caps, connectors, end stops, coupling sleeves, wall brackets, and other accessories as required for secure and operational installation. Provide a quantity of carriers for 6-inch spacing the full length of the curtain plus 1 additional carrier.

1. Carriers: High-quality nylon rollers with Velcro brand 1 inch black steel hook and loop fasteners where applicable.

2.03

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine ceilings for suitable conditions where cubicle track is to be installed.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install cubicle curtain track level and plumb, according to manufacturer's written instructions and original design.

B. Install ceiling-mounted tracks at intervals of not less than 24 inches.

C. Wall attachment:
1. Provide continuous industrial strength Velcro adhesive strip vertically at wall where curtain touches wall.
2. Sew Velcro strip along vertical edge of curtain where curtain touches wall.

3.03 PROTECTION

A. Protect installed track opening with a nonresidue adhesive tape to prevent debris from the ceiling finishing operation from impeding carrier operation.

END OF SECTION – 10 2123

SECTION 11 6000 - LABORATORY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Gas cylinder rack and bracket.
   2. Privacy shower curtain system.

B. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment for installation

1.2 SUBMITTALS

A. Submit complete submittal package of informational submittals. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.

B. Informational Submittals:
   1. Coordination Drawings: For overhead supported equipment.
      a. Indicate locations of overhead supported equipment and connections to utilities.
      b. Key equipment using same designations as indicated on Drawings.
      c. Include plans, reflected ceiling plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.
      d. Include details of seismic bracing for equipment.
   2. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Experienced installers' who have completed installation of products similar to that indicated for this Project and whose work has resulted in a record of successful in-service performance. Where required by product manufacturer, installers shall be authorized, trained and approved by equipment manufacturer.

B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

C. Product Designations: Drawings or Specifications indicate sizes and configurations of laboratory equipment by referencing designated manufacturer's model numbers. Other manufacturers' laboratory equipment of similar sizes, configurations and complying with the Specifications may be considered.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install products until building is enclosed and weather tight, utility roughing-in and wet work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of the construction period.

1.5 COORDINATION

A. Coordinate product layout and installation with other work, including layout and installation of framing, reinforcement required to support product, plumbing, fire protection, mechanical, electrical, and communications components.

B. Coordinate locations and requirements of utility service connections.

C. Coordinate sizes, locations, and requirements of the following:
   1. Overhead equipment supports and ceilings.

PART 2 - PRODUCTS

A. Privacy Curtain, Basis of Design Product: Guardian, Model 21075, for use with emergency shower.
   1. See drawing for configuration indicated.
   2. Stainless Steel Frame
   3. Vinyl Curtain

B. Gas Cylinder Racks, Basis-of-Design Product: Safe-T-Rack Systems, Inc.; Models 2412 and 2422. See drawings for configuration indicated.
   1. Rack Fabrication: Welded steel tubing with baked-on powder-coat finish; dual safety chains at each cylinder bay; floor and wall mounting hardware.
   2. Finish: Epoxy powder coat.
   3. Color: White

C. Cylinder Bracket:
   1. Location: Refer to sheet QL-202
   2. Material: P1000 unistrut, to match the existing salvaged Unistrut.
   3. Finish: Epoxy powder coat.
   4. Dimension: 24” wide at 2 cylinder restraint
   5. Rows: 2 Upper row at 36” above floor; Lower row at 18” above floor.
   6. Restraint: Welded link stainless steel chain with stainless steel carabiner clasp. Each chain restraint to accommodate one 9” cylinder.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment level and plumb, according to manufacturer’s written instructions.
   1. Verify utility services are in required locations and are ready for use before installation of equipment.
   2. Complete equipment assembly where field assembly is required.
   3. Connect equipment to utilities.

B. Install equipment with access and maintenance clearances that comply with manufacturer’s written installation instructions and requirements of authorities having jurisdiction.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections:

1. Perform visual, mechanical and electrical inspection and testing for each product according to manufacturers' written recommendations. Certify compliance with each manufacturer's equipment-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
5. After making corrections, retest products that failed to perform.

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

C. Prepare test and inspection reports.

3.3 CLEANING AND PROTECTION

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition. Adjust hardware and moving parts to function smoothly and lubricate as recommended by manufacturer.

C. Protect equipment from damage during remainder of the construction period.

END OF SECTION 11 6000

SECTION 12 3553 - LABORATORY CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Laboratory work surfaces.
2. Drying rack (pegboard).
3. Metal casework- Adjustment to existing casework.
4. Flammable and acid cabinets under fumehood.
5. Ceiling service carrier.
6. Laboratory Gas service Fittings

1.2 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. Hardwood Plywood: A panel product composed of layers, or plies, of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive and faced both front and back with hardwood veneers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS – GENERAL

A. Submittal Sequence: Submit Product Data, Samples, and Informational Submittals for Architect's Action before submitting Shop Drawings. Submit Action Submittals under separate transmittal from Informational Submittals.

B. Incomplete submittals are not acceptable, will be considered non-responsive and will be returned for re-submittal without review.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Composite Wood Products: Product data indicating that products contain no urea formaldehyde.
2. Adhesives: Product data indicating that products contain no urea formaldehyde.

B. Shop Drawings: For laboratory countertops. Include plans, elevations, sections, and attachment details.

1. Show details of anchoring to permanent building construction, including locations of blocking, reinforcements, and other supports required for installation.
2. Include locations of clearances from adjoining walls, doors, ceilings, and other building construction.
3. Include coordinated dimensions for laboratory casework, laboratory equipment, and laboratory accessories specified in other Sections.
4. Include rough-in information for mechanical, plumbing and electrical services. Show locations and size of cutouts and holes for service fittings, and other items installed in laboratory casework.

C. Samples: For cabinet finishes, hardware finishes, countertops, service fittings finishes, and other materials requiring color selection.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical resistance.

1.7 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 applicable to cabinet material(s) specified.

1.9 PROJECT CONDITIONS

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

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with laboratory countertops by field measurements before fabrication.
1. Establish Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.10 EXTRA MATERIALS

A. Furnish complete touchup kit for each type and color of laboratory casework materials provided. Include fillers, primers, paints, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finishes.

B. Furnish extra materials that match products installed and that are packaged with protective coverings for storage and identified with labels describing contents.
   1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Laboratory Casework Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mott Manufacturing Ltd.
   2. H2I Group, Inc

B. Epoxy Resin Countertop Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Basis of Design: Durcon, Inc.; www.durcon.com.

C. Water and Laboratory Gas Service Fitting Basis of Design Manufacturer: Subject to compliance with requirements provide Water Saver Faucet Co. products indicated on drawings or comparable products by one of the following:
   1. Watersaver, Inc
   2. Broen, Inc.
   3. Chicago Faucet Company.

D. Source Limitations: Obtain laboratory casework from single source from single manufacturer unless otherwise indicated. Metal shop tables may be obtained from any of the above-listed manufacturers.

E. Product Designations: Drawings indicate sizes and configurations of laboratory casework and of water and laboratory gas service fittings by referencing designated manufacturer's catalog numbers. Other manufacturers of laboratory casework and water and laboratory gas service fittings of similar sizes and configurations and complying with Specifications may be considered. See Section 016000 "Product Requirements."

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Laboratory casework systems and support framing system, including attachments to other work, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and the applicable building code.
   1. The term “withstand” means the unit will remain in place without separation of any parts from the device when subjected to seismic forces indicated.

2.3 CASEWORK, GENERAL

A. Work Surface Product Standard: Comply with SEFA 3, “Laboratory Work Surfaces.”

2.4 MATERIALS

A. Steel Materials:
   1. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

B. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish, and having a flame-spread index of 25 or less according to ASTM E 84.
   1. Physical Properties:
      a. Flexural Strength: Not less than 10,000 psi (70 MPa).
      b. Modulus of Elasticity: Not less than 2,000,000 psi (14000 MPa).
      c. Hardness (Rockwell M): Not less than 100.
      d. Water Absorption (24 Hours): Not more than 0.02 percent.
      e. Heat Distortion Point: Not less than 260 deg F (127 deg C).
   2. Chemical Resistance: Epoxy-resin material, in specified color, when tested with reagents according to SEFA 3 “Work Surfaces Chemical/Stain Resistance Test,” shall have no more than four Level-3 conditions.
   3. Color: Black.

2.5 AUXILIARY MATERIALS

A. Furring, Blocking, Shims and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Sealants:
   1. Sealant Joints and Penetrations in Work Surface Material: Silicon sealant recommended by work surface manufacturer.
   2. Sealant Joints Between Laboratory Casework and Adjoining Construction: Refer to Division 07 Section “Sealants.”

C. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.

D. Steel Tubing: ASTM A 500, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, standard weigh (Schedule 40), unless otherwise indicated.

2.6 METAL CABINET FABRICATION.

A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).

B. Apron Leg: Welded tubing legs, not less than 2 inches (50 mm) square with channel aprons/frames, reinforcing cross-rails, and stretchers. Legs welded or bolted to apron/frame with heavy-duty corner brackets; weld or bolt reinforcing cross-rails to front and back apron/frame.

Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to aprons/frames. Provide threaded leveling device insert welded to bottom of each leg, unless otherwise indicated.

1. Leg Rails and Stretchers: Where indicated, channel leg rails welded or bolted to legs; channel stretcher welded or bolted to leg rails.
2. Leveling Devices: Adjustable height type with nylon glides; minimum 1 inch (25 mm) diameter with minimum 5/8 inch (16 mm) height adjustment.
3. Leg Shoes: 2-1/2 inch (64 mm) high, black vinyl or rubber, open-bottom, slip-on type. Leg shoe shall be adjustable to conceal leveling devices and hold-down clips.
4. Hold-Down Clips: Manufacturer's standard clip for anchoring table legs to floor.
    a. Provide hold-down clips at apron leg assemblies integrated with other fixed casework assemblies.

C. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.

1. Provide fixed and removable panels at knee-spaces; incorporate electrical and data service fittings in fixed portion of knee-space panels.
2. Provide closure panels at utility spaces where utility space would otherwise be exposed to view.
3. Provide removable finished back panels where back of utility space is exposed to view; conceal fasteners.
4. Provide hinged access panel for access to utility space where indicated.

2.7 METAL FINISH

A. Prepare, treat and finish welded assemblies after assembling. Prepare, treat and finish, components that are assembled with mechanical fasteners before assembling. Prepare, treat and finish concealed surfaces same as exposed surfaces.

B. Chemical-Resistant Finish: Laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.5 mil average and 1.2 mil minimum on exterior and interior surfaces exposed to view; 1.2 mil average on backs of cabinets and other surfaces not exposed to view.

1. Ends of cabinets, including those installed directly against walls or other cabinets are defined as "exposed."
2. Chemical and Physical Resistance of Finish System: Finish shall comply with acceptance levels of cabinet surface finish tests in SEFA 8M. Acceptance level for chemical spot test shall be no more than four Level 3 conditions, and results shall be within the range indicated for each chemical reagent.
3. Colors for Metal Laboratory Casework Finish: As selected by Architect from manufacturer's full range.
    a. Cabinet Body Color: by Mott, or approved equivalent color from other manufacturer
    b. Cabinet Door and Drawer Color: by Mott, or approved equivalent color from other manufacturer
    c. Countertop Support Leg Color: by Mott, or approved equivalent color from other manufacturer

2.8 CASEWORK HARDWARE AND ACCESSORIES

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type, unless otherwise indicated. The

existing cabinet and drawer hardware are in functional condition, however adjust and align to ensure that all cabinets and drawer are in good working conditions.

B. Butt Hinges: Stainless-steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two hinges for doors 48 inches (1200 mm) high or less and three hinges for doors more than 48 inches (1200 mm).
   1. Provide full height stainless steel piano hinges at flammable and hazardous material storage cabinets, unless otherwise required by manufacturer's listed and labeled cabinet assembly.

C. Hinged Door and Drawer Pulls: Provide back-mounted pulls with lock washers, unless otherwise indicated. Provide two pulls for drawers more than 24 inches (600 mm) wide. Mount drawer pulls horizontally, door pulls vertically.
   1. Stainless-steel wire pulls, nominal 1 by 4-1/2 inches (25 by 114 mm).

D. Door Catches: Nylon-roller spring catches.
   1. Provide at cabinet doors, except where elbow catches are indicated.
   2. Base Cabinets: Attach to top of cabinet doors.
   3. Wall Cabinets: Attach to bottom of cabinet doors.
   4. Upper and Tall Cabinets: Attach at top and bottom of cabinet doors.

E. Elbow Catches: Spring type, zinc plated steel, with strike of suitable design.
   1. Provide at left-hand door of cabinets with pair of doors and cabinet lock.
   2. Provide at fixed center shelf of left-hand door of tall cabinets with pair of doors and cabinet lock.

F. Drawer Slides: Side/rail mounted, full extension slides; zinc plated steel with steel ball bearings, designed to prevent rebound when drawers are closed.
   1. Box Drawers and Pull-Out Shelves: Medium duty slides, minimum 100 lbs (45 kg) capacity.
   2. File Drawers: Heavy-duty slides, minimum 150 lbs (68 kg) capacity, with over-travel.

G. Grommets: Provide grommets through work surfaces and other locations where indicated on drawings.
   1. Products: Subject to compliance with requirements, provide products by Doug Mockett & Company, Inc. or comparable products by laboratory casework manufacturer.
      a. Round Plastic Grommet: Doug Mockett & Company, Inc.; Product – Round Plastic Grommet Sleeve, Model XG1 – 3" Grommet Sleeve.
   2. Finish Color: Black

H. Drying Racks: Drying racks shall be fabricated of one piece, 20 gauge, Type 304 stainless steel with a Number 4 finish. Provide top with two 90-degree bends and side with one 90-degree bend. Bottom shall have two 90-degree bends to provide and integral drip trough and catch drain. Provide front with a multiple of T-shaped holes to accommodate pegs.
   1. Kewaunee X-020005. Provide sizes as shown on the drawings:
      a. 24 inches L x 30 inches H.
   2. Pegs: Injection molded white polypropylene; 1/2 inch in diameter and 6 inches long. T-shaped protrusion base of pegs shall allow for easy removal and replacement without the need for tools. Design T-shaped holes to fit protrusion on support pegs for holding single or multiple utensil drip trays, drain shelves, funnel racks, or pipette holders. Provide five 2-3/4 inch peg extenders for each drying rack.
   3. Drip trough: Provide 20 gauge, Type 304 stainless steel with 3/8 inch OD stainless drain tube and a stainless steel screen insert. Screen shall be 16 gauge, 14 by 14 mesh, 0.025 wire. Provide 36" long (minimum) PVC draw hose.

4. Provide with hanger to allow removal and replacement of entire rack for cleaning without need for tools

2.9 LABORATORY WORK SURFACES

A. Work Surfaces, General: Provide units with smooth surfaces in uniform plane, free of defects. Make exposed edges and corners straight and uniform. Provide front and end overhang of 1 inch (25 mm), see configurations, including thicknesses, on drawings.

B. Epoxy Resin Countertops: Fabricate with cutouts for sinks, holes for service fittings and accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.
   1. Configuration: Flat, 1 inch (25 mm) thick, with beveled edge and corners, and with drip groove 1/2 inch (13 mm) back from edge.
   2. Backsplash: All backsplashes at sink counter tops shall be made of ¾” thick epoxy resin. Color to match adjacent work surface.
      a. Height: 4 inch (100 mm) high, unless otherwise indicated on drawings.
      b. Provide where tops abut partitions, fume hoods and other adjoining above counter elements.
      c. Other curb conditions as indicated on drawings.
      d. Color: Black. Thickness: 1”, Type: greenstone.

2.10 LABORATORY GAS AND WATER SERVICE FITTINGS

A. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures - Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.
   1. Provide units that comply with "Vandal-Resistant Faucets and Fixtures" recommendations in SEFA 7.

B. Materials: Fabricated from cast or forged red brass unless otherwise indicated.
   1. Specialty Gas Service Fittings: Type 316 stainless steel valve construction, where indicated on drawings.

C. Finish - General: Polished chromium plated finish with baked-on clear epoxy coating, unless otherwise indicated.

D. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf (22 N) to operate. Provide units designed for working pressure up to 125 psig (690 kPa), with serrated outlets, unless otherwise indicated.

E. Needle Valves: Provide units with self-centering, floating cones and renewable seats of stainless steel or Monel metal.
   1. Needle Valves: Provide units designed for maximum working pressure up to 125 psig.
   2. Fine Control Needle Valves: Provide units designed for maximum working pressure up to 250 psig.
   3. Pressure Regulators: Provide where indicated.
      a. Type: Non-relieving type with brass body and neoprene diaphragm.

b. Inlet Pressure Range: 5 to 300 psig.
c. Outlet Pressure Range: 5 to 125 psig.

4. Outlets:
a. Serrated hose end, unless otherwise indicated.
b. Quick connect fittings where indicated, keyed type by service.
c. Model :
1. Basis of Design: Watersaver L4800-325, wall mounted, coordinate with GA Tech the final gas valves types in Lab 230.
2. Basis of Design: Watersaver L4200-158WSA, single ball valve, deck mounted w/ forged lever handle, turret base, mounting shank and removable serrated hose end
3. Basis of Design: Watersaver L4203-158WSA, single ball valve, panel/overhead mounted w/ forged lever handle, mounting shank, and removable quick-connect fitting w/ 1/4" npt male plug.
1.

F. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."

G. Handles: Provide three- or four-arm, forged-brass handles for valves unless otherwise indicated.
1. Provide lever-type handles for ball valves unless otherwise indicated. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
2. Provide heat-resistant plastic handles for steam valves.
3. Provide knurled, molded-plastic handles for needle valves.

H. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.
1. Where color coded handles are indicated, provide neutral colored disk with contrasting color embossed identification.

I. Safety Fittings:
1. Comply with requirements of ANSI Z358.1
2. Drench Hose and Eye/Face Wash Units: Spray-type heads to deliver soft, wide, high-volume spray of water, integral self-regulating flow control, reticulated polyurethane filter, threaded spray cover and hinged swing-away dust cover.
a. Model: Refer to Laboratory Accessories schedule on sheet QL-010.
3. Utility Services: Refer to Division 22 sections for supply and waste piping, tempered water mixing valves, flow switches and connections to building automation system or alarm as indicated.
4. Safety Fitting Signage: Provide ANSI-compliant identification signs at safety fittings.

2.11 SPECIAL PURPOSE STEEL STORAGE CABINETS (for use under fume hoods):

A. Under-counter Corrosives Storage Cabinets:
1. Cabinet Material and Design: Metal laboratory casework with inset doors.
2. Cabinet Construction: Comply with requirements for metal laboratory casework and the following:
a. Cabinet Use: Storage of acids and bases, where indicated on Drawings.
b. Cabinet Lining: Chemical resistant polyethylene lining, top, bottom, sides, back, and inside of cabinet doors; 2-inch high lip at front cabinet opening; cabinet lining shall be liquid tight to minimum depth of 2-inches.
c. Cabinet Back: Removable back panels for access to utility chase from inside cabinet.

d. Shelves: Provide two, half-depth shelves with polyethylene or polyolefin spill tray with 1-inch high raised lip four sides of each shelf.
e. Cabinet Ventilation: Provide two, 2-inch diameter polypropylene or polyolefin threaded vent pipe outlets (one high, one low) with sealed pipe joints. Secure vent outlets to back of cabinet with locking nut and seal to back panel.
    1. Connect laboratory exhaust system duct to vent pipe outlets at back of cabinet; refer to Division 23 Section for duct connection, including duct.
f. Cabinet Hardware: Locks, catches, fasteners, shelf supports and other hardware items shall be corrosion resistant materials, compatible with materials being stored. Provide cabinet lock.
g. Identification: Storage cabinet shall be identified with conspicuous, minimum 2-inch high lettering to identify the material being stored (e.g. ACIDS, BASES) as indicated on Drawings.

B. Under-counter Flammable Liquid (Solvent) Storage Cabinets:
1. Cabinet Material and Design: Metal laboratory casework with inset doors.
2. Cabinet Construction: Comply with requirements of NFPA-30 and the following:
    a. Provide self-closing doors with fusible link and coordinator; doors shall be self-latching with three-point latch arrangement.
    b. Provide continuous stainless steel piano hinges and cabinet locks.
    c. Cabinet Back Option: Provide units with removable back where standard to manufac turer's listed and labeled products.
    d. Spill Containment: Provide minimum 2-inch high raised lip at bottom of cabinet behind doors or spill tray with 2-inch high raised lip on four sides; bottom of cabinet or spill tray shall be liquid tight to depth of 2-inches.
    e. Shelves: One, full-depth shelf; adjustable where standard to manufacturer's listed and labeled products.
    f. Cabinet Ventilation: Two, 2-inch diameter threaded pipe vent outlets (high and low at back of cabinet) with flame arrestors and bungs (caps). Vent outlets shall be capped.
    g. Identification: Flammable liquid storage cabinets shall be identified with conspicuous, two-inch high letting to read "FLAMMABLE KEEP FIRE AWAY" in color contrasting with the cabinet finish color. Provide additional identification for "solvent" storage cab -inets indicated on Drawings.
    h. Labeling: Cabinets shall be listed and leveled per Quality Assurance Article in Part 1, Provide testing laboratory labels on top interior of cabinet door.

2.12 CEILING SERVICE CARRIER

A. Ceiling Service Carrier: Ceiling Service Column shall be sourced from same manufacturer as laboratory casework in order to assure compatibility of connections with other casework elements.

B. Basis of Design Product:
1. Subject to compliance with requirements, provide Ceiling service Column, Item Number 950H0930, H2I Group, or comparable product by one of the following:
    a. Mott Manufacturing

2. Utility Services and Laboratory Accessories: Pre-punch service panel for services and accessories indicated on drawings, detail 4/QL-901.

PART 3 - EXECUTION

3.1 INSTALLATION OF CABINETS

A. Comply with installation requirements in SEFA 2. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.

C. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

D. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.2 INSTALLATION OF WORK SURFACES

A. Comply with installation requirements in SEFA 2. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.

B. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
   1. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.

C. Fastening:
   1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
   2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch (3 mm,) and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
   3. Provide utility space framing, wood blocking, cleats, or other reinforcement to support edge of countertops at adjoining construction.

D. Seal unfinished edges and cutouts in wood countertops with heavy coat of polyurethane varnish.

E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
   1. Apply sealant at joints between countertops, curbs, and splash, and adjoining walls. Comply with Division 07 Section “Joint Sealants.”

F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.3 INSTALLATION OF CASEWORK ACCESSORIES

A. Install accessories according to Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions.

B. Securely fasten adjustable shelving supports to partition framing, wood blocking, or reinforcements in partitions.

C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

3.4 INSTALLATION OF SERVICE FITTINGS

A. Comply with requirements in other Sections for installing water and laboratory gas service fittings and electrical devices.

B. Install fittings according to Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

3.5 CLEANING AND PROTECTING

A. Clean finished surfaces touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil (0.15-mm) plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches (1200 mm) o.c.

END OF SECTION 12 3553