PROJECT MANUAL

PORTERS CROSSING PAD ‘B’ BUILDING
CONSTRUCTION DOCUMENTS

SALTUS ARCHITECTURE + URBAN DESIGN
PROJECT NUMBER - 16016

JULY 18, 2017
Project Directory
Porters Crossing Pad ‘B’
4095 East Pony Express Parkway
Eagle Mountain, Utah 84005

Owner
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630 E. South Temple
Salt Lake City, Utah 84102

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EAGLE MOUNTAIN, UTAH

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1.1 PROJECT INFORMATION

A. Notice to Bidders: Owner invited bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

B. Project Identification: Porters Crossing – Pad ‘B’ Building.
   1. Project Location: 4095 East Pony Express Parkway, Eagle Mountain, Utah.

C. Owner: Pony Express Land Development, Inc. – 630 E. South Temple, Utah 84102.
   1. Owner’s Representative: Toby Cordova

D. Architect: Saltus Architecture + Urban Design
   contact: Rhett Stone - email: rhett@saltusarch.com. phone: (503) 707-7305
   1. Project Description: Project consists of New two story mixed-use building including site improvements.

E. Construction Contract: Bids will be received for the following Work:
   1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
   2. Bid Time: 5:00 p.m., local time.

B. Bids will be thereafter privately opened.

1.3 BID SECURITY

A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 30 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.
1.4 DOCUMENTS

A. Online Procurement and Contracting Documents: Obtain access after August 14, 2017 by contacting Rhett Stone - Saltus Architecture + Urban Design, email: rhett@saltusarch.com. Online access will be provided to invited prime bidders only.

1.5 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time (180 days). Work is subject to $500/day liquidated damages.

1.6 BIDDER'S QUALIFICATIONS

A. Bidders must be prequalified by Owner.

B. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work.

END OF DOCUMENT 00 11 16
Instructions to Bidders for the following PROJECT:
PORTERS CROSSING – PAD ‘B’ BUILDING
4095 E. Pony Express Parkway
Eagle Mountain, Utah 84005

THE OWNER:
Pony Express Land Development, Inc.
630 E. South Temple
Salt Lake City, Utah 84102

THE ARCHITECT:
Saltus Architecture + Urban Design
1443 West 800 North
Orem, Utah 84057

1.1 DEFINITIONS

A. Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consists of the Invitation to Bid, Instructions to Bidders, the bid form and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract, Drawings, Specifications and all Addenda issued prior to execution of the Contract.

1.2 BIDDER’S REPRESENTATIONS

A. The Bidder by making a Bid represents that:
   1. The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the work for the bid as submitted.
   2. The Bid is made in compliance with the Bidding Documents.
   3. The Bidder has visited the site and became familiar with the conditions under which the Work is to be performed.
   4. The Bid is based upon materials, equipment and systems required by the Bidding Documents to complete the PROJECT without exception.

1.3 BIDDING DOCUMENTS

A. Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner or Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
B. The Bidder shall carefully study and compare the Bidding Documents with each other, and shall examine the site and local conditions and at once report to the Architect errors, inconsistencies or ambiguities discovered.

C. Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

D. Interpretations, corrections and changes of the Bidding Documents will be made by Addendum.

E. Substitutions
   1. The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
   2. No substitution will be considered prior to the receipt of Bids unless written request for approval has been received by the Architect at least seven days prior to the date for receipt of Bids. Refer to 00 26 00 “Procurement Substitution Procedures” for additional information.
   3. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
   4. The Architect’s decision of approval or disapproval of a proposed substitution shall be final.

F. Addenda
   1. Addenda will be transmitted to all invited Prime Bidders.
   2. Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for the Bids or one which includes postponement of the date for receipt of Bids.
   3. Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

1.4 BIDDING PROCEDURES

A. Bids shall be submitted on the form included in the Bidding Documents – 00 41 13 BID FORM.

B. All blanks on the bid form shall be legibly executed in a non-erasable medium.

C. Sums shall be expressed in both words and figures. In case of discrepancy, the amount written shall govern.

D. Each copy of the Bid shall state the legal name of the Bidder and the nature of the legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract.
1.5 **SUBMISSION OF BIDS**

A. All copies of the Bid and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder’s name and address. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation “SEALED BID ENCLOSED” on the face thereof.

B. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

C. The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

D. Oral, telephonic, telegraphic or other electronically transmitted bids will not be considered.

1.6 **MODIFICATION OR WITHDRAWAL OF BIDS**

A. A bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

B. Prior to the time and date designated for receipt of Bids submitted may be modified or withdrawn by notice to the party receiving Bids at the designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder.

C. Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

1.7 **CONSIDERATION OF BIDS**

A. Opening of Bids – At the discretion of the Owner, the properly identified Bids received on time will be privately opened.

B. Rejection of Bids – Owner shall have the right to reject any and all Bids. A bid not accompanied by data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

C. Acceptance of Bid (Award) – It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive information and irregularities in a Bid received and to accept the Bid which, in the Owner’s judgment, is in the Owner’s own best interests.
1.8 **POST-BID INFORMATION**

A. Contractor’s Qualification Statement – Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor’s Qualification Statement.

B. Owner’s Financial Capacity – The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner’s obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and contractor.

1.9 **SUBMITTALS**

A. The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:
   1. A designation of the Work to be performed with the Bidder’s own force;
   2. Names of the manufacturers, products, and suppliers of principal items or systems of materials and equipment proposed for the Work; and
   3. Names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

B. The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

C. Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder’s option, (1) withdraw the Bid or (2) submit an acceptable substitution person or entity with an adjustment in the Base bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder.

D. Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

1.10 **PERFORMANCE BOND AND PAYMENT BOND**

A. If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder’s usual sources.
B. If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

C. If the Owner requires that bonds be secured from other than the Bidder’s usual sources, changes in cost will be adjusted as provided in the Contract Documents.

D. The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered.

E. Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

F. The bonds shall be dated on or after the date of the Contract.

G. The Bidder shall require the attorney-in-fact who executed the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

1.11 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum.

END OF DOCUMENT 00 21 13
1.1 **DEFINITIONS**

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 “Substitution Procedures” for conditions under which Substitution requests will be considered following Contract award.

1.2 **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.

1.3 **PROCUREMENT SUBSTITUTIONS**

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

1.4 **SUBMITTALS**

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than 7 days prior to date of bid opening.
2. Submittal Format: Submit copy of each written Procurement Substitution Request, using CSI Substitution Request Form 1.5C.


   a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.

   b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:

   1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.

   2) Copies of current, independent third-party test data of salient product or system characteristics.

   3) Samples where applicable or when requested by Architect.

   4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. 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.

   5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

   6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES.

   7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.

   c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.

   d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect’s Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect’s approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 00 26 00
1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.


C. Related Requirements:

1. Document 00 21 13 "Instructions to Bidders' for the Bidder's responsibilities for examination of Project site and existing conditions.

END OF DOCUMENT 00 31 32
GEOTECHNICAL EVALUATION
EAGLE MOUNTAIN RETAIL CENTER
PONY EXPRESS PARKWAY AND PORTERS CROSSING
EAGLE MOUNTAIN, UTAH
WT JOB NO. 6120JT179

Western Technologies Inc.
The Quality People
Since 1955

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Prepared for:

AMSOURCE

January 25, 2011

Warren D. Clyde, P.E.
Principal

Robert E. Wenzel, Jr., P.E.
Director of Geotechnical Services
Amsource
358 South Rio Grande Street, Suite 200
Salt Lake City, Utah 84101

Attn: Mr. Bill Gaskill

Re: Geotechnical Evaluation
Eagle Mountain Retail Center
Pony Express Parkway and Porters Crossing
Eagle Mountain, Utah

WT Job No. 6120JT179

Western Technologies, Inc. (WT) has completed the geotechnical evaluation for the proposed Eagle Mountain Retail Center to be located at Pony Express Parkway and Porters Crossing in Eagle Mountain, Utah. This study was performed in general accordance with our proposal number 6120PT122, dated July 1, 2010. The results of our evaluation, including the boring location diagram, boring logs, laboratory test results, and geotechnical recommendations are attached.

We appreciate being of service to you in the geotechnical engineering phase of this project and are prepared to assist you during the construction phases as well. If design conditions change, or if you have any questions concerning this report or any of our materials testing, special inspection, or consulting services, please do not hesitate to contact us. We look forward to working with you on future projects.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Engineering Services

Warren D. Clyde, P.E.
Principal

Copies to: Addressee (3)
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GEOTECHNICAL EVALUATION
EAGLE MOUNTAIN RETAIL CENTER
PONY EXPRESS PARKWAY AND PORTERS CROSSING
EAGLE MOUNTAIN, UTAH
WT JOB NO. 6120JT179

1.0 PURPOSE

This report contains the results of our geotechnical evaluation for the proposed Eagle Mountain Retail Center to be located at Pony Express Parkway and Porters Crossing in Eagle Mountain, Utah. The purpose of these services is to provide information and recommendations regarding:

- Foundation design parameters, including footing types, depths, allowable bearing capacities, and estimated settlements
- Lateral earth pressures
- Earthwork, including site preparation, fill placement, and suitability of existing soils for fill materials
- Drainage
- Pavements
- Seismic considerations
- Corrosivity
- Excavation conditions
- Slabs-on-grade
- Groundwater
- Percolation rates
- Geologic hazards

Our services included obtaining information on site conditions, performing field and laboratory testing, performing engineering analyses, providing recommendations for use in foundation, floor slab, and on-site pavement design, and presenting earthwork guidelines. Results of the field exploration, field tests, and laboratory tests are presented in the Appendices.

2.0 PROJECT DESCRIPTION

Project information supplied by Mr. Bill Gaskill on June 28, 2010 indicates that the proposed development will consist of 7 retail buildings and a 47,389 square foot grocery store. The retail buildings and grocery will consist of 1 to 2-story, structures using masonry, steel frame or wood frame construction. The maximum wall and column loads are assumed to be 7 to 8 kips per linear foot and 100 to 125 kips, respectively. We anticipate that the ground floor level will be at or slightly above existing site grade and that no extraordinary slab criteria are required. On-site asphalt paved areas for parking and driveways and rigid pavement sections for loading and dumpster areas will be constructed. Final site grading plans were not available at the time of this report. Should our assumptions not be correct, we should be notified immediately.
3.0 SCOPE OF SERVICES

3.1 Field Exploration

Fifteen (15) borings were drilled to depths of 21.5 feet below existing grade in the proposed building areas. In addition, twenty-two (22) borings were drilled to depths of 6.5 feet in the proposed paved parking and drive areas. The borings were at the approximate locations shown on the attached Boring Location Diagram. A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Final logs, included in Appendix A, represent our interpretation of the field logs and may include modifications based on laboratory observations and tests of the field samples. The final logs describe the materials encountered, their thicknesses, and the locations where samples were obtained.

The Unified Soil Classification System was used to classify soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A. Local and regional geologic characteristics were used to estimate the seismic design criteria and evaluate subsidence zones.

3.2 Laboratory Analyses

Laboratory analyses were performed on representative soil samples to aid in material classification and to estimate pertinent engineering properties of the on-site soils for preparation of this report. Testing was performed in general accordance with applicable ASTM test methods. The following tests were performed and the results are presented in Appendix B.

- Water Content
- Dry Density
- Consolidation
- Plasticity
- Minus #200 Sieve
- Gradation
- Soluble Sulfates Content

3.3 Analyses and Report

Analyses were performed and this report was prepared for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. A separate Phase I Environmental Site Assessment which addresses environmental concerns was completed for this project (WT Job No 6120JW096).
This geotechnical engineering report includes a description of the project, a discussion of the field and laboratory testing programs, a discussion of the subsurface conditions, and design recommendations as required to satisfy the purpose previously described.

4.0 SITE CONDITIONS

4.1 Surface

At the time of our exploration, the site was undeveloped range land. The ground surface was flat and contained a moderate to heavy growth of grass, weeds, and sagebrush. Site drainage trended to the north or west as sheet surface flow.

4.2 Subsurface

As presented on Logs of the Borings, surface soils consisted of 1 foot of topsoil over 0 to 10 feet of sandy silt, silt, and clay layers. Near surface soils are of low to moderate plasticity and have pinhole structure typical of hydro-collapsible soils. The materials underlying the surface soils and extending to the full depth of exploration consisted of silty sand, sandy gravel and silty gravel soils and appeared to be non-collapsible.

4.3 Groundwater

Groundwater was not encountered at the time of exploration to the total depth explored of 21.5 feet. These observations represent the groundwater conditions at the time of measurements and may not be indicative of other times. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions, groundwater withdrawal and recharge, local irrigation practices, and future development.

4.4 Geology

The site is located between the Lake Mountain Range west of Utah Lake and the Traverse Mountains to the north. The site is located on lacustrine deposits over older alluvial-fan deposits. These deposits consist mainly of silt and clay over sand, silt, and pebble gravel (Geologic Map of the Saratoga Springs 7.5" Quadrangle Utah County, Utah, UGS 2004). The nearest fault is mapped approximately 1/2 miles to the east of the northeast corner of the Property.
5.0 GEOTECHNICAL PROPERTIES & ANALYSIS

5.1 Laboratory Tests

Laboratory test results (see Appendix B) indicate that native subsoils near shallow foundation level exhibit moderate compressibility at existing water contents. Significant additional compression/collapse occurs in the collapsible silt and clay soils in the upper 2 to 10 feet when the water content is increased.

Near-surface soils are of low to moderate plasticity. These soils exhibit low expansion potential when recompacted, confined by loads approximating floor loads and saturated. Slabs-on-grade supported on recompacted native soils have a low potential for heaving if the water content of the soil increases. Densification of the soil by the passage of construction equipment may increase the expansion potential of the native clayey soil.

5.2 Field Tests

Native gravel subsoils below the silt and clay surface soils exhibited moderate to high resistance to penetration using the standard penetration test method (ASTM D1586) or Ring-lined barrel sampling (ASTM D3550). These soils correlate to have moderate to high bearing capacity in their present condition.

The boring logs included in this report are indicators of subsurface conditions only at the specific location and date noted. Variations from the field conditions represented by the boring may become evident during construction. If variations appear, we should be contacted to re-evaluate our recommendations.

6.0 RECOMMENDATIONS

6.1 General

Recommendations contained in this report are based on our understanding of the project criteria described in Section 2.0, Project Description, and the assumption that the soil and subsurface conditions are those disclosed by the borings. Others may change the plans, final elevations, number and type of structures, foundation loads, and floor levels during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing.
6.2 Design Considerations

The borings indicate the presence of hydro-collapsible soils on the site in the upper 10 feet in some areas of the site. These soils exhibit a large collapse potential with an increase in moisture content. Structures and related improvements situated on collapsible soils could be subject to relatively large movements if the foundation soils experience an increase in moisture content. Foundations and slabs should not bear upon the collapsible soils. All collapsible soils should be removed from beneath any structure and be replaced with engineered fill. During earthwork operations a representative from WT should observe the removal of the collapsible soils and approve the subgrade prior to engineered fill placement.

6.3 Foundations

Conventional spread-type footings may be used to support the proposed structures. Since the native silt and clay surface soils exhibit substantial collapse potentials, the footings should bear on either native non-collapsible sand and gravel soils or upon engineered fills achieved by removal and replacement of the collapsible soils below footings and slabs. The depth and lateral extent of the engineered fills is presented in the Earthwork section of this report.

Alternative footing depths and allowable bearing capacities are presented in the following tabulation:

<table>
<thead>
<tr>
<th>Footing Depth Below Finished Grade (ft)*</th>
<th>Allowable Bearing Capacity (psf)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>3000</td>
</tr>
<tr>
<td>2.5</td>
<td>3000</td>
</tr>
</tbody>
</table>

* Finished grade is the lowest adjacent grade for perimeter footings and footings in unheated spaces and floor level for interior footings in heated spaces. The footing depths given are for frost protection.

** Allowable bearing capacities assume fulfillment of Earthwork recommendations.

The allowable bearing capacities apply to dead loads plus design live load conditions. Recommended minimum widths of column and wall footings are 30 inches and 18 inches, respectively.
Thickened slab sections can be used to support interior partitions, provided that:

- The slabs are supported upon engineered fill,
- the loads do not exceed 900 plf,
- thickened sections have a minimum width of 12 inches, and
- thickness and reinforcement are consistent with structural requirements.

We anticipate that the total and differential movement of the proposed structures, supported as recommended, should be less than 1 and $\frac{1}{2}$ inches, respectively. Additional foundation movements could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

All footings, stem walls, and masonry walls should be reinforced to reduce the potential for distress caused by differential foundation movements. The use of joints at openings or other discontinuities in masonry walls is recommended.

We recommend that the geotechnical engineer or his representative observe the footing excavations before reinforcing steel and concrete are placed. This observation is to assess whether the soils exposed are similar to those anticipated for support of the footings. Any soft, loose or unacceptable soils should be undercut to suitable materials and backfilled with approved fill materials or lean concrete. Soil backfill should be properly compacted.

6.4 Lateral Design Criteria

Lateral loads may be resisted by concrete interface friction and by passive resistance. For shallow foundations bearing on properly compacted fill at this site, we recommend the following lateral resistance criteria:

- Coefficient of Friction......................... 0.30
- Passive Pressure............................. 300 psf/ft

The frictional resistance and the passive pressure may be combined without reduction in determining the total lateral resistance.

6.5 Earth Retaining Structures

a. Unrestrained Structures

Earth retaining structures less than 8 feet in height, above any free water surface, with level backfill and no surcharge loads may be designed using the equivalent fluid pressure method. Recommended equivalent fluid pressures and coefficients of base friction for unrestrained elements are:
Active:
- Undisturbed subsoil ................................................................. 35 psf/ft
- Compacted granular backfill .................................................. 30 psf/ft
- Compacted site soils (non-clay) ............................................... 35 psf/ft
- Clay site soils ........................................................................ not recommended for use

Passive:
- Shallow wall footings .............................................................. 250 psf/ft
- Shallow column footings ......................................................... 400 psf/ft

Coefficient of base friction ...................................................... 0.40*

* The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

b. Restrained Structures

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

At-rest:
- Undisturbed subsoil ................................................................. 60 psf/ft
- Compacted granular backfill .................................................. 55 psf/ft

The equivalent fluid pressures presented herein do not include the lateral pressures arising from the presence of:

- hydrostatic conditions, submergence or partial submergence
- sloping backfill, positively or negatively
- surcharge loading, permanent or temporary
- seismic or dynamic conditions

We recommend a free-draining soil layer or manufactured geosynthetic material, be constructed adjacent to the back of any retaining walls. A filter may be required between the soil backfill and drainage layer. This drainage zone should help prevent development of hydrostatic pressure on the wall. This vertical drainage zone should be tied into a gravity drainage system at the base of the wall. It is important that all backfill be properly placed and compacted. Backfill should be mechanically compacted in layers. Flooding or jetting should not be permitted. Care should be taken not to damage the walls when placing the backfill. Backfills should be observed and tested during placement.

Fill against footings, stem walls, basement walls and retaining walls should be compacted to densities specified in Earthwork. Medium to high plasticity clay soils should not be used as backfill against retaining walls. Compaction of each lift adjacent to walls should
be accomplished with hand-operated tampers or other lightweight compactors. Overcompaction may cause excessive lateral earth pressures that could result in wall movements.

6.6 Seismic Considerations

For structural designs based upon the International Building Code 2009, the following criteria will apply. The soil site class is D. $S_a$, the spectral acceleration for short periods, is 0.890g. $S_1$, the spectral acceleration for a 1-second period, is 0.354 g. $F_s$ and $F_v$, in accordance with Table 1613.5.3 (1) and 1613.5.4 (2), are 1.144 and 1.709, respectively.

Liquefaction potential is shown as “Very Low” on the Selected Critical Facilities and Geologic Hazards, Utah County, Utah, map by UGS. Due to the absence of shallow groundwater at the site and the dense gravel soils underlying the site, WT considers the potential for settlement due to liquefaction to be very low.

6.7 Conventional Slab-on-Grade Support

Floor slabs can be supported on properly placed and compacted fill or non-collapsible native soils. The slab subgrade should be prepared by the procedures outlined in this report. A minimum 4-inch layer of clean 3/8 to ¾ inch gravel or clean untreated base course should be provided beneath all slabs to help prevent capillary rise and a damp slab.

For design of interior slabs-on-grade on native gravel soils or engineered fill, we recommend using a modulus of subgrade reaction (k) of 250 pounds per cubic inch (pci). Onsite clay and silt soils are not recommended for support of slabs-on-grade.

The use of vapor retarders is desirable for any slab-on-grade where the floor will be covered by products using water based adhesives, wood, vinyl backed carpet, impermeable floor coatings (urethane, epoxy, acrylic terrazzo, etc.) or where the floor will be in contact with moisture sensitive equipment or product. When used, the design and installation should be in accordance with the recommendation given in ACI 302.2R-06.

If moisture sensitive equipment, product, floor coverings, or impermeable floor coverings are to be placed on interior slabs-on-grade, consideration should be given to the use of a vapor retarder. Final determination on the use of a vapor retarder should be left to the slab designer.

All concrete placement and curing operations should follow the American Concrete Institute manual recommendations. Improper curing techniques and/or high slump (high water-cement ratio) could cause excessive shrinkage, cracking or curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor covering.
6.8 Drainage

One major cause of soil problems in this vicinity is moisture increase in soils below structures. Therefore, it is extremely important that positive drainage be provided during construction and maintained throughout the life of the proposed development. Infiltration of water into utility or foundation excavations must be prevented during construction. No planters or other surface features that could retain water adjacent to the building should be constructed.

In areas where sidewalks or paving do not immediately adjoin the structure, protective slopes should be provided with an outfall of about 5 percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to minimize the possibility of moisture infiltration.

If planters and/or landscaping are adjacent to or near the structure, we recommend the following:

- Planters should be sealed.
- Grades should slope away from the structure(s).
- Only shallow rooted landscaping should be used.
- Watering should be kept to a minimum.

6.9 Corrosivity

The chemical test results indicate that the site soils are negligibly corrosive to concrete. However, in order to be consistent with standard local practice and for reasons of material availability, we recommend that Type II Portland cement be used for all concrete on and below grade.

6.10 Pavements

The on-site soils silt and clay soils are considered as very poor quality materials for support of pavements. However the gravel soils encountered in some areas are considered as good to very good quality material for support of pavements. Therefore the type of sub-grade soils encountered during construction will determine the pavement thickness design required. The types of traffic anticipated to use the facility include passenger vehicles and medium to large size trucks. On this basis, a daily traffic value of 7 Equivalent 18-kip Single Axle Loads (ESAL) was estimated for passenger car parking and a daily traffic value of 70 ESALs were used for local roads, major truck access drives and dock areas. A resilient modulus ($M_r$) of 4500 pounds per square inch was assigned to the on-site silt and clay soils and 15,000 pounds per square inch was assigned to the on-site gravel soils. A reliability value of 85 percent was assigned to the facility that corresponds to occasional interruption
of traffic for pavement repairs. Based upon these parameters, the resulting pavement sections according to the AASHTO procedure for a 20-year design life are:

<table>
<thead>
<tr>
<th>Traffic Area</th>
<th>Asphalitic Concrete Pavement (inches)</th>
<th>Portland Cement Concrete (inches)</th>
<th>Untreated Base Course (inches)</th>
<th>Subbase Course (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car Parking Lot and Drives (Clay and Silt Sub-grade Soils)</td>
<td>3</td>
<td>--</td>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>Local Roads and Truck Dock Access Drives (Clay and Silt Sub-grade Soils)</td>
<td>3.5</td>
<td>--</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Car Parking Lot and Drives (Clay and Silt Sub-grade Soils)</td>
<td>--</td>
<td>5</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Local Roads and Truck Dock Access Drives (Clay and Silt Sub-grade Soils)</td>
<td>--</td>
<td>8</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Car Parking Lot and Drives (Gravel Sub-grade Soils)</td>
<td>3</td>
<td>--</td>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>Local Roads and Truck Dock Access Drives (Gravel Sub-grade Soils)</td>
<td>3.5</td>
<td>--</td>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>Car Parking Lot and Drives (Gravel Sub-grade Soils)</td>
<td>--</td>
<td>5</td>
<td>6</td>
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</tr>
<tr>
<td>Local Roads and Truck Dock Access Drives (Gravel Sub-grade Soils)</td>
<td>--</td>
<td>6</td>
<td>6</td>
<td>--</td>
</tr>
</tbody>
</table>

The "design life" of a pavement is defined as the expected life at the end of which reconstruction of the pavement will need to occur. Normal maintenance, including crack sealing, slurry sealing, and/or chip sealing, should be performed during the life of the pavement.

Collapsible soils may experience settlement under pavements if they experience a change in moisture content. To eliminate this possibility all collapsible soils below pavements should be removed and re-compact ed to the requirements for engineered fill prior to pavement section placement.

The potential settlement may be lessened by scarifying and re-compacting the native clay subgrade below pavement sections a minimum of 12 inches prior to subbase or untreated base placement and by insuring good drainage away from pavement edges. This option
does not completely remove the total potential for settlement of the pavement and may result in greater maintenance costs in the future.

Due to the high static loads imposed by parking trucks in dock, loading and unloading areas and at dumpster locations, we recommend that a rigid pavement section be considered for these areas.

Bituminous surfacing should be constructed of dense-graded, central plant-mix, asphalt concrete. Base course material should conform with specification requirements for Untreated Base, Aggregate Base of City of Eagle Mountain or the Utah Department of Transportation specifications.

Material and compaction requirements should conform to recommendations presented under Earthwork. The gradient of paved surfaces should ensure positive drainage. Water should not pond in areas directly adjoining paved sections.

7.0 EARTHWORK

7.1 General

The conclusions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Any excavating, trenching, or disturbance that occurs after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. It is not reasonable to rely upon our conclusions and recommendations if any future unobserved and untested trenching, earthwork activities or backfilling occurs.

Although fills or underground facilities such as septic tanks, cesspools, basements, utilities, and dry wells were not observed, such features might be encountered during construction. These features should be demolished in accordance with the recommendations of the geotechnical engineer. Any loose or disturbed soils resulting from demolition should be removed or recompacted as engineered fill and any excavations should be backfilled in accordance with recommendations presented herein.

7.2 Site Clearing

Strip and remove any existing vegetation, organic topsoils, debris, fill, collapsible and any other deleterious materials from the building and pavement areas. The building area is defined as that area within the building footprint plus 5 feet beyond the perimeter of the footprint. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.
7.3 **Excavation**

We anticipate that excavations for shallow foundations and utility trenches for the proposed construction can be accomplished with conventional equipment.

On-site silt and clay soils will pump or become unworkable at high water contents. Workability may be improved by scarifying and drying. In addition, the silt and clay soils on site are very moisture sensitive and can be difficult to achieve the desired densities during construction without very tight moisture control and thin lift placement. Over-excavation of wet zones and replacement with granular materials may be necessary. The use of lightweight excavation and compaction equipment may be required to minimize subgrade pumping.

The soils to be penetrated by the proposed excavations may vary significantly across the site. Our soil classifications are based solely on the materials encountered in widely spaced exploratory test borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are found at the time of construction, we should be contacted immediately to evaluate the conditions encountered.

7.4 **Temporary Excavations and Slopes**

Excavations into the on-site soils will encounter a variety of conditions. The individual contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

If any excavation, including a utility trench, is extended to a depth of more than 20 feet, it will be necessary to have the side slopes designed by a professional engineer.

As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance back from the crest of the slope at least equal to the slope height. The exposed slope face should be protected against the elements.

We recommend that the contractor retain a geotechnical engineer to observe the soils exposed in all excavations and provide engineering design for the slopes. This will provide an opportunity to classify the soil types encountered, and to modify the excavation slopes as necessary. This also allows the opportunity to analyze the stability of the excavation slopes during construction.
7.5 Building Pad Preparation

Remove existing soils throughout the entire building area to non-collapsible sand and gravel soils. Based upon the boring log information this depth can range from 0 to 10 feet below the existing ground surface. This includes both foundation and interior floor slab areas. Following the removal, recompact the bottom of the excavation to a firm and unyielding condition. Refill the excavation with properly compacted engineered fill material. The removal and replacement should extend laterally a minimum of 5 feet beyond the perimeter of the building.

7.6 Foundation Preparation

Specialized treatment of existing soils within foundation areas is not required if building pad preparation is followed. Footings should bear upon undisturbed, non-collapsible, native, gravel soils or upon engineered fill extending to non-collapsible gravel soils.

7.7 Conventional Interior Slab Preparation

To minimize or remove the potential for slab settlement due to collapsible soils, slabs-on-grade should be founded on non-collapsible native sand and gravel soils or upon engineered fill extending to non-collapsible sand and gravel soil. Following removal of collapsible soils, scarify, moisten or dry as recommended, and recompact all subgrade soils to a minimum depth of 8 inches. Replace with properly placed and compacted, engineered fill material.

All utility trenches and foundations under slabs should be backfilled with engineered fill or clean 3/8 to ¾ inch gravel.

7.8 Exterior Slab Preparation

Collapsible silt and clay subgrade soils may settle when the water content increases. Therefore, exterior concrete grade slabs may settle, resulting in cracking or vertical offsets. This potential would be greatest where slabs overlie collapsible silt and clay subgrade soils or un-compacted fill. To reduce the potential for damage, we recommend:

- All utility trenches and foundation backfill below exterior slabs be backfilled with engineered fill.
- Placement of effective control joints on relatively close centers
- Moisture-density control during placement of subgrade fills
- Provision for adequate drainage in areas adjoining the slabs
- Use of designs which allow vertical movement between the exterior slabs and adjoining structural elements

All joints should be sealed with an elastomeric joint sealant.
7.9 **Pavement Preparation**

Collapsible silt and clay soils should be removed and re-compact ed to the requirements for engineered fill prior to placement of pavement subbase and/or untreated base. Alternatively, if approved by the owner, pavement sections may be placed over native collapsible soils provided they are scarified to a depth of 12 inches below subbase and re-compact ed to the requirements of engineered fill to reduce the collapse potential. Subgrade soils should be firm and unyielding prior to placement of pavement materials. Any soft or yielding areas should be removed and replaced with engineered fill.

7.10 **Materials**

Clean on-site native clay and silt soils may be used as fill material for the following:

- pavement areas below pavement sections
- non-structural backfill
- landscaping and general fill

Native sand and gravel soils may be used as fill material for the following:

- engineered fill
- pavement areas below pavement sections
- structural backfill

Imported soils should conform to the following:

- **Gradation (ASTM C136):**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>100</td>
</tr>
<tr>
<td>4&quot;</td>
<td>85-100</td>
</tr>
<tr>
<td>%&quot;</td>
<td>70-90</td>
</tr>
<tr>
<td>No. 4 Sieve</td>
<td>50-80</td>
</tr>
<tr>
<td>No. 200 Sieve</td>
<td>25(max)</td>
</tr>
</tbody>
</table>

Oversize material, greater than 6 inches, may be used in the lower portions of the building pad, below 3 feet, provided that the particles are distributed throughout the fill and no nesting of oversize material occurs.

The materials used in the upper 3 feet of the building pad should be reasonable free of rocks or lumps having a particle diameter greater than 6 inches. Acceptance of the quantity of oversize material shall be at the discretion of the geotechnical engineer.
7.11 Placement and Compaction

a. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.

b. Uncompacted fill lifts should not exceed 10 inches.

c. Materials should be compacted to the following:

<table>
<thead>
<tr>
<th>Minimum Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Compaction (ASTM D1557)</td>
</tr>
</tbody>
</table>

- On-site soil, reworked and fill:
  - Below footings ................................................................. 95
  - Below slabs-on-grade ......................................................... 95
  - Below pavement ................................................................. 95
- Imported soil:
  - Below footings ................................................................. 95
  - Below slabs-on-grade ......................................................... 95
  - Below pavement ................................................................. 95
- Untreated base course below slabs-on-grade .................................. 95
- Untreated base and subbase below pavement .................................. 95
- Nonstructural backfill ................................................................ 90

On-site clayey soils should be compacted within a water content range of 0 to 3 percent above optimum. Imported and on-site granular soils with low expansion potential should be compacted within a water content range of 3 percent below to 3 percent above optimum.

7.12 Compliance

Recommendations for slabs-on-grades, foundations, and pavement elements supported on compacted fills or prepared subgrade depend upon compliance with Earthwork recommendations. To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer.

8.0 LIMITATIONS

This report has been prepared based on our understanding of the project criteria as described in Section 2.0. Others may make changes in the project criteria during design or construction, and substantially different subsurface conditions may be encountered or become known. The conclusions and recommendations presented herein shall not continue to be valid unless all variations are brought to our attention in writing, and we have had an opportunity to assess the effect such variations may have on our conclusions and recommendations and respond in writing.
Amsource  
Ref. No: 6120JT179

The recommendations presented are based upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. The geotechnical engineer necessarily makes assumptions as to the uniformity of the geology and soil structure between borings, but variations can exist. Accordingly, whenever any deviation or change is encountered or become known during design or construction, WT shall be notified in writing. WT shall review the matter, and issue a written response regarding the validity of the conclusions and recommendations presented herein.

This report does not provide information relative to construction methods or sequences. Any person reviewing this report must draw his/her own conclusions regarding site conditions as they relate to the employment or development of construction techniques. This report is valid for one year after the date of issuance unless there is a change in circumstances or discovered variations justifying an earlier expiration of validity. After expiration, no person or entity has any right to rely on this report without further review and reporting by WT under a separate contract.

The recommendations contained herein may be based upon government regulations in effect at the time of this report. Future changes or modifications to these regulations may require modification of this report.

9.0 OTHER SERVICES

The geotechnical engineer should be retained for a general review of final plans and specifications to evaluate compliance with our recommendations.

The geotechnical engineer should also be retained to provide observation and testing services during excavation, earthwork operations, foundation and construction phases of the project. Observation of footing excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present.

10.0 CLOSURE

We prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon conditions at the location of specific tests, observations and data developed to satisfy the scope of services defined by the contract documents. Work on your project was performed in accordance with generally accepted industry standards and practices by other professionals providing similar services in this locality. No other warranty, express or implied, is made.
Allowable Soil Bearing Capacity: The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.

Backfill: A specified material placed and compacted in a confined area.

Base Course: A layer of specified material placed on a subgrade or subbase.

Base Course Grade: Top of base course.

Bench: A horizontal surface in a sloped deposit.

Caisson: A concrete foundation element cast in a circular excavation which may have an enlarged base. Sometimes referred to as a cast-in-place pier.

Concrete Slabs-On-Grade: A concrete surface layer cast directly upon a base, subbase or subgrade.

Crushed Rock Base Course: A base course composed of crushed rock of a specified gradation.

Differential Settlement: Unequal settlement between or within foundation elements of a structure.

Engineered Fill: Specified material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer.

Existing Fill: Materials deposited through the action of man prior to exploration of the site.

Existing Grade: The ground surface at the time of field exploration.

Expansive Potential: The potential of a soil to expand (increase in volume) due to absorption of moisture.

Fill: Materials deposited by the actions of man.

Finished Grade: The final grade created as a part of the project.

Gravel Base Course: A base course composed of naturally occurring gravel with a specified gradation.

Heave: Upward movement.

Native Grade: The naturally occurring ground surface.

Native Soil: Naturally occurring on-site soil.

Rock: A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.

Sand and Gravel Base: A base course of sand and gravel of a specified gradation.

Sand Base Course: A base course composed primarily of sand of a specified gradation.

Scarify: To mechanically loosen soil or break down existing soil structure.

Settlement: Downward movement.

Soil: Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water.

Strip: To remove from present location.

Subbase: A layer of specified material placed to form a layer between the subgrade and base course.

Subbase Grade: Top of subbase.

Subgrade: Prepared native soil surface.
# Coarse-Grained Soils

<table>
<thead>
<tr>
<th>GROUP SYMBOLS</th>
<th>DESCRIPTION</th>
<th>MAJOR DIVISIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW</td>
<td>Well-Graded Gravels or Gravel-Sand Mixtures, less than 5% Fines</td>
<td>Gravels</td>
</tr>
<tr>
<td>GP</td>
<td>Poorly-Graded Gravels or Gravel-Sand Mixtures, less than 5% Fines</td>
<td>None</td>
</tr>
<tr>
<td>GM</td>
<td>Silty Gravels, Gravel-Sand-Silt Mixtures, more than 12% Fines</td>
<td>None</td>
</tr>
<tr>
<td>GC</td>
<td>Clayey Gravels, Gravel-Sand-Clay Mixtures, more than 12% Fines</td>
<td>None</td>
</tr>
<tr>
<td>SW</td>
<td>Well-Graded Sands or Gravely Sands, less than 5% Fines</td>
<td>Sands</td>
</tr>
<tr>
<td>SP</td>
<td>Poorly-Graded Sands or Gravely Sands, less than 5% Fines</td>
<td>None</td>
</tr>
<tr>
<td>SM</td>
<td>Silty Sands, Sand-Silt Mixtures, more than 12% Fines</td>
<td>None</td>
</tr>
<tr>
<td>SC</td>
<td>Clayey Sands, Sand-Clay Mixtures, more than 12% Fines</td>
<td>None</td>
</tr>
</tbody>
</table>

**Note:** Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

# Fine-Grained Soils

<table>
<thead>
<tr>
<th>GROUP SYMBOLS</th>
<th>DESCRIPTION</th>
<th>MAJOR DIVISIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>Inorganic Silts, Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands</td>
<td>Silts and Clays</td>
</tr>
<tr>
<td>CL</td>
<td>Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays</td>
<td>Liquid Limit Less than 50</td>
</tr>
<tr>
<td>OL</td>
<td>Organic Silts or Organic Silt-Clays of Low Plasticity</td>
<td>None</td>
</tr>
<tr>
<td>MH</td>
<td>Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silts, Elastic Silts</td>
<td>Silts and Clays</td>
</tr>
<tr>
<td>CH</td>
<td>Inorganic Clays of High Plasticity, Fat Clays</td>
<td>Liquid Limit More than 50</td>
</tr>
<tr>
<td>OH</td>
<td>Organic Clays of Medium to High Plasticity</td>
<td>None</td>
</tr>
<tr>
<td>PT</td>
<td>Peat, Muck and Other Highly Organic Soils</td>
<td>Highly Organic Soils</td>
</tr>
</tbody>
</table>

**Note:** Fine-grained soils may receive dual classification based upon plasticity characteristics.

## Soil Sizes

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>SIZE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>Above 12 in.</td>
</tr>
<tr>
<td>Cobbles</td>
<td>3 in. – 12 in.</td>
</tr>
<tr>
<td>Gravel</td>
<td>No. 4 – 3 in.</td>
</tr>
<tr>
<td>Coarse</td>
<td>3/4 in. – 3 in.</td>
</tr>
<tr>
<td>Fine</td>
<td>No. 4 – 3/4 in.</td>
</tr>
<tr>
<td>Sand</td>
<td>No. 200 – No. 4</td>
</tr>
<tr>
<td>Coarse</td>
<td>No. 10 – No. 4</td>
</tr>
<tr>
<td>Medium</td>
<td>No. 40 – No. 10</td>
</tr>
<tr>
<td>Fine</td>
<td>No. 200 – No. 40</td>
</tr>
</tbody>
</table>

*Fines (Silt or Clay) Below No. 200

**Note:** Only sizes smaller than three inches are used to classify soils.

## Clays & Silts: Blows per foot

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>BLOWS PER FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Soft</td>
<td>0 – 2</td>
</tr>
<tr>
<td>Soft</td>
<td>2 – 4</td>
</tr>
<tr>
<td>Firm</td>
<td>4 – 8</td>
</tr>
<tr>
<td>Stiff</td>
<td>8 – 16</td>
</tr>
<tr>
<td>Very Stiff</td>
<td>16 – 32</td>
</tr>
<tr>
<td>Hard</td>
<td>Over 32</td>
</tr>
</tbody>
</table>

## Sands & Gravels: Blows per foot

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>BLOWS PER FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 – 4</td>
</tr>
<tr>
<td>Loose</td>
<td>4 – 10</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>10 – 30</td>
</tr>
<tr>
<td>Dense</td>
<td>30 – 60</td>
</tr>
<tr>
<td>Very Dense</td>
<td>Over 60</td>
</tr>
</tbody>
</table>

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D) split spoon (ASTM D1556).

## Plasticity of Fine Grained Soils

<table>
<thead>
<tr>
<th>PLASTICITY INDEX</th>
<th>TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Non-Plastic</td>
</tr>
<tr>
<td>1 – 7</td>
<td>Low</td>
</tr>
<tr>
<td>8 – 25</td>
<td>Medium</td>
</tr>
<tr>
<td>Over 25</td>
<td>High</td>
</tr>
</tbody>
</table>

## Definition of Water Content

- Dry
- Slightly Damp
- Damp
- Moist
- Wet
- Saturated

## Eagle Mountain Retail Center

Method of Classification
Western Technologies Inc.
Job No.: 6120JT179
Plate: A-2
The number shown in "BORING NO." refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features, or through the use of Global Positioning System (GPS) devices.

"DRILLING TYPE" refers to the exploratory equipment used in the boring wherein HSA = hollow stem auger, and the dimension presented is the outside diameter of the HSA used.

"N" in "BLOWS/FT." refers to a 2-in. outside diameter split-barrel sampler driven into the ground with a 140 lb. drop-hammer dropped 30 in. repeatedly until a penetration of 18 in. is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-in. increments totaling 18 in. The number of blows required for advancing the sampler for the last 12 in. (2\textsuperscript{nd} and 3\textsuperscript{rd} increments) is defined as the Standard Penetration Test (SPT) "N"-Value. Refusal to penetration is considered more than 50 blows per foot. (Ref. ASTM D 1586).

"R" in "BLOWS/FT." refers to a 2.5-in. outside diameter ring-lined split spoon sampler driven into the ground with a 140 lb. drop-hammer dropped 30 in. repeatedly until a penetration of 12 in. is achieved or until refusal. The number of blows required to advance the sampler 12 in. is defined as the "R" blow count. The "R" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows per foot. (Ref. ASTM D 3550).

"SAMPLE TYPE" refers to the form of sample recovery, in which N = Split-barrel sample, R = Ring-lined sample, G = Grab sample, B = Bucket sample, C = Core sample (ex. diamond bit rock coring).

"DRY DENSITY (LBS/CU FT)" refers to the laboratory-determined dry density in pounds per cubic foot. The symbol "NR" indicates that no sample was recovered. The symbol "DU" indicates that determination of dry density was not possible.

"MOISTURE CONTENT (% OF DRY WT.)" refers to the laboratory-determined water content in percent (Ref. ASTM D2216).

"USCS" refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D 2487 and D 2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location. The transition between materials is approximate and may be more or less gradual than indicated.
**BORING NO. B-1**

**DATE DRILLED:** 1-4-11

**LOCATION:** See Location Diagram

**ELEVATION:** Not Determined

**EQUIPMENT TYPE:** Mobile B-80

**DRILLING TYPE:** 6"HSA

**FIELD ENGINEER:** C. Ege

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (lbs/cu ft)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>15</td>
<td>N</td>
<td>20</td>
<td>5</td>
<td>SM</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>SM</td>
<td>14</td>
<td>N</td>
<td>14</td>
<td>10</td>
<td>GP</td>
<td>Silty SAND; medium dense, light brown, dry, CaCO3 veins</td>
</tr>
<tr>
<td>SM</td>
<td>26</td>
<td>N</td>
<td>21</td>
<td>15</td>
<td>SM</td>
<td>Poorly Graded GRAVEL with sand and silt; medium dense to very dense, light brown, slightly damp, angular to subrounded gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td>GM</td>
<td>30</td>
<td>N</td>
<td>20</td>
<td>20</td>
<td>GP</td>
<td>Silty SAND with gravel; medium dense, light brown, slightly damp, angular to subrounded gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td>GM</td>
<td>20 for 6&quot;</td>
<td>N</td>
<td>21</td>
<td>20</td>
<td>GM</td>
<td>Poorly Graded GRAVEL with sand and silt; very dense to very dense, light brown, slightly damp, angular to subrounded gravel up to 1&quot; in diameter</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered
DATE DRILLED: 1-4-11
LOCATION: See Location Diagram
ELEVATION: Not Determined

EQUIPMENT TYPE: Mobile B-80
DRILLING TYPE: 6" HSA
FIELD ENGINEER: C. Ege

SOIL DESCRIPTION

TOPSOIL; Sandy SILT, stiff, brown, moist

Silty SAND; medium dense, light brown, slightly damp, fine-grained sand, iron staining

Poorly Graded GRAVEL with sand and silt and clay; medium dense to dense, light brown, slightly damp, angular to subrounded gravel up to 1.5" in diameter

Silty SAND with gravel; medium dense, light brown, slightly damp, angular to subrounded gravel up to 1" in diameter, some iron staining, crude bedding

Poorly Graded GRAVEL with sand and silt; dense, light brown, slightly damp, angular to subrounded gravel up to 1" in diameter

BORING TERMINATED AT 21.5 FEET

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179

PLATE A-5

WESTERN TECHNOLOGIES INC.
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (LBS/FT^3)</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>Not Determined</td>
<td>Not Determined</td>
<td>N</td>
<td>14 18 21</td>
<td>ML SM</td>
<td>TOPSOIL; Sandy SILT with isolated gravel, stiff, brown, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>17 21 16</td>
<td>GM</td>
<td>Silty SAND with gravel; medium dense, light brown, dry, gravel up to 1&quot; in diameter, most gravel 0.25&quot; or less</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty GRAVEL; medium dense, light brown, dry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179
PLATE A-6

WESTERN TECHNOLOGIES INC.

BORING LOG
BORING NO. B-4  
EQUIPMENT TYPE: Mobile B-80
DRILLING TYPE: 6"HSA
FIELD ENGINEER: W.Clyde

<table>
<thead>
<tr>
<th>MOISTURE</th>
<th>DRY DENSITY</th>
<th>SAMPLE</th>
<th>BLOW</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT</td>
<td>(LBSCU FT)</td>
<td>TYPE</td>
<td>COUNTS</td>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>% by wt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILT with gravel; stiff, light brown, dry, CaCO3 veins, subrounded gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sandy SILT; stiff, light brown, slightly damp, CaCO3 veins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty Sandy GRAVEL; medium dense, brown, damp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gravelly SAND; medium dense to dense, brown to grey, damp</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 21.5 FEET

NOTES: Groundwater Not Encountered
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SOIL DESCRIPTION</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>TOPSOIL: Sandy SILT, stiff, brown, moist</td>
<td>19</td>
<td>19</td>
<td>R</td>
<td>19 19 18</td>
</tr>
<tr>
<td></td>
<td>Sandy SILT; stiff, brown, damp, some pinholes</td>
<td>11</td>
<td>16 17</td>
<td>R</td>
<td>11 16 17</td>
</tr>
<tr>
<td></td>
<td>Sandy CLAY; stiff, brown, damp, no pinholes</td>
<td>15</td>
<td>20 18</td>
<td>N</td>
<td>15 20 18 50</td>
</tr>
<tr>
<td></td>
<td>Silty Sandy GRAVEL; medium dense to dense, brown, damp</td>
<td>18</td>
<td>18 25</td>
<td>N</td>
<td>18 18 25 50</td>
</tr>
<tr>
<td></td>
<td>Sandy GRAVEL with silt; medium dense, brown to gray, damp</td>
<td>20</td>
<td>28 50</td>
<td>N</td>
<td>28 50</td>
</tr>
<tr>
<td></td>
<td>Gravelly SAND with silt; dense, brown to gray, damp</td>
<td>21.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER
**REF. NO.:** 6120JT179

**PLATE:** A-8
### BORING NO. B-6

#### EQUIPMENT TYPE: Mobile B-80
#### DRILLING TYPE: 6"HSA
#### FIELD ENGINEER: W. Clyde

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Blows/CU FT</th>
<th>Sample</th>
<th>Blows</th>
<th>Depth (Feet)</th>
<th>M.O.</th>
<th>D. D.</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>24</td>
<td>24</td>
<td>26</td>
<td>ML</td>
<td></td>
<td></td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>R</td>
<td>13</td>
<td>16</td>
<td>27</td>
<td>ML</td>
<td></td>
<td></td>
<td>Sandy SILT; very stiff, brown, dry, calcareous</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>15</td>
<td>39</td>
<td>SM</td>
<td></td>
<td></td>
<td>Silty SAND; medium dense to dense, brown, dry, gravel in bottom 6&quot;</td>
</tr>
<tr>
<td>N</td>
<td>14</td>
<td>16</td>
<td>4</td>
<td>GP</td>
<td></td>
<td></td>
<td>Sandy GRAVEL with sandy CLAY; loose, brown, damp to moist</td>
</tr>
<tr>
<td>N</td>
<td>16</td>
<td>18</td>
<td>18</td>
<td>GP</td>
<td></td>
<td></td>
<td>Sandy GRAVEL; medium dense, brown to gray, damp</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 21.5 FEET**

---

**NOTES:** Groundwater Not Encountered

---

**WESTERN TECHNOLOGIES INC.**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER

**REF. NO.: 6120JT179**

---

**PLATE:** A-9
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><strong>TOPSOIL:</strong> Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>2</td>
<td>Sandy SILT; very stiff, brown, dry to damp, calcareous, pinholes</td>
</tr>
<tr>
<td>5</td>
<td>Sandy GRAVEL with silt; loose to medium dense, brown, damp to moist</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered
Boring No. B-8

Equipment Type: Mobile B-80
Drilling Type: 6" HSA
Field Engineer: W. Clyde

Soil Description:

- ML: Topsoil; Sandy SILT, stiff, brown, moist
- CL: Clay; trace sand, stiff, light brown, dry, calcareous
- Sandy gravel with silt; medium dense to dense, brown to grey, damp

Boring terminated at 21.5 feet

Notes: Groundwater not encountered

Date Drilled: 1-7-11
Location: See Location Diagram
Elevation: Not determined

Moisture Content (% of dry wt.)
Dry Density (lbs/cu ft)
Sample Type
Sample
Blow Counts
Depth (feet)
USCS
Graphic

This summary applies only at this location and at the time of logging. Conditions may differ at other locations and may change at this location with time. Data presented is a simplification.

Western Technologies Inc.

Project: Eagle Mountain Retail Center
Ref. No.: 6120JT179
Plate A-11
**BORING NO. B-9**

**ELEVATION:** Not Determined

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (% by dry wt)</th>
<th>DRY DENSITY (lbs/ft³)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>30</td>
<td>N</td>
<td>16</td>
<td>5</td>
<td>GP</td>
<td>GM</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>30</td>
<td>35</td>
<td>N</td>
<td>17</td>
<td>10</td>
<td>CL</td>
<td></td>
<td>Sandy SILT; very stiff, light brown, dry, calcareous, pinholes</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>N</td>
<td>7</td>
<td>15</td>
<td>CL</td>
<td></td>
<td>Sandy GRAVEL with silt; medium dense to dense, brown, dry to damp</td>
</tr>
<tr>
<td>18</td>
<td>15</td>
<td>N</td>
<td>14</td>
<td>25</td>
<td>CL</td>
<td></td>
<td>Sandy CLAY with Gravel; very stiff, brown, moist</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
<td>N</td>
<td>14</td>
<td>20</td>
<td>SP</td>
<td></td>
<td>Gravelly SAND with silt; dense, brown to grey, damp</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered
### BORING NO. B-10

**DATE DRILLED:** 1-7-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined  
**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6"HSA  
**FIELD ENGINEER:** W.Clyde

<table>
<thead>
<tr>
<th>MOISTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT (% dry wt)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
</tr>
<tr>
<td>BLOW</td>
</tr>
<tr>
<td>COUNTS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USC</td>
</tr>
<tr>
<td>GRAPHIC</td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **TOPSOIL:** Sandy SILT, stiff, brown, moist
- Sandy CLAY; stiff, brown, dry to damp, calcareous, pinholes
- **Silty SAND:** medium dense, brown, dry, no pinholes
- Sandy GRAVEL with silt; medium dense to dense, brown to grey, moist
- Interbedded Sandy GRAVEL and silty SAND; dense, brown, moist
- Silty Sandy GRAVEL; dense, brown to gray, damp

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered

**WESTERN TECHNOLOGIES INC.**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-13

**BORING LOG**
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>MOISTURE CONTENT (% by weight)</th>
<th>DRY DENSITY (lbs/cuft)</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>N</td>
<td>18</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>12</td>
<td>N</td>
<td>12</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td>Silty Sandy GRAVEL; medium dense, brown, damp</td>
</tr>
<tr>
<td>21</td>
<td>N</td>
<td>21</td>
<td>28</td>
<td>GP</td>
<td>5</td>
<td></td>
<td>Silty SAND; medium dense, brown, damp</td>
</tr>
<tr>
<td>13</td>
<td>N</td>
<td>13</td>
<td>34</td>
<td>GP</td>
<td>5</td>
<td></td>
<td>Sandy GRAVEL with silt; dense, brown to grey, damp</td>
</tr>
<tr>
<td>5</td>
<td>N</td>
<td>5</td>
<td>11</td>
<td>GP</td>
<td>5</td>
<td></td>
<td>Gravelly SAND with silt; medium dense to dense, brown to grey, damp</td>
</tr>
<tr>
<td>3</td>
<td>N</td>
<td>3</td>
<td>5</td>
<td>SM</td>
<td></td>
<td></td>
<td>SILT some sand; stiff, brown, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Clayey SAND; very loose to loose, brown to grey, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 21.5 FEET</td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER
**REF. NO.:** 6120JT179

---

**WESTERN TECHNOLOGIES INC.**

**PLATE** A-15

**BORING LOG**
**BORING NO. B-13**

**DATE DRILLED:** 1-7-11  
**EQUIPMENT TYPE:** Mobile B-80  
**LOCATION:** See Location Diagram  
**DRILLING TYPE:** 6"HSA  
**FIELD ENGINEER:** W.Clyde  
**ELEVATION:** Not Determined

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>G</td>
<td>0</td>
<td>100</td>
<td>0.10</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P</td>
<td>0</td>
<td>100</td>
<td>0.10</td>
<td>Clayey SAND; firm, brown, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>0</td>
<td>100</td>
<td>0.10</td>
<td>Sandy GRAVEL with silt; medium dense, brown to gray, damp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>0</td>
<td>100</td>
<td>0.10</td>
<td>Silty SAND; loose, brown to grey, moist</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-16

---

**WESTERN TECHNOLOGIES INC.**

**BORING LOG**
**BORING NO. B-14**

**DATE DRILLED:** 1-7-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined

**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6" HSA  
**FIELD ENGINEER:** W. Clyde

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (LBS/CF)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R</td>
<td>15 19 17</td>
<td></td>
<td>ML</td>
<td>CL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R</td>
<td>11 15 18</td>
<td></td>
<td>GP</td>
<td>GM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>11 15 17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>8 15 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>14 25 29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>10 14 16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **TOPSOIL:** Sandy SILT, stiff, brown, moist
- **Sandy CLAY:** very stiff, brown, damp, calcareous, pinholes
- **Sandy GRAVEL with silt:** medium dense, brown to grey, damp
- **Silty SAND:** medium dense, brown, moist

**BORING TERMINATED AT 21.5 FEET**

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179

**WEATHERFORD TECHNOLOGIES INC.**  
**PLATE A-17**
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>15</td>
<td>Silty SAND; medium dense, brown, moist</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>Silty SAND; medium dense, brown, moist</td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered

**BORING TERMINATED AT 21.5 FEET**
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>1-2</td>
<td>Sandy SILT; very stiff, brown, damp, pinholes, calcareous</td>
</tr>
<tr>
<td>2-3</td>
<td>Silty SAND with Gravel; medium dense, brown, damp</td>
</tr>
<tr>
<td>3-5</td>
<td>Sandy GRAVEL with silt; medium dense, brown, damp</td>
</tr>
<tr>
<td>5-10</td>
<td>Sandy CLAY with gravel; stiff, brown to gray, damp</td>
</tr>
<tr>
<td>10-15</td>
<td>Sandy GRAVEL with silt; medium dense, brown to gray, damp</td>
</tr>
<tr>
<td>15-20</td>
<td>Poorly Graded SAND with gravel and some silt; medium dense, brown, damp</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 21.5 FEET

NOTES: Groundwater Not Encountered
<table>
<thead>
<tr>
<th>M.O.I Rate</th>
<th>Dry Density</th>
<th>Blows/Counts</th>
<th>Sample Type</th>
<th>Depth (Feet)</th>
<th>USCS</th>
<th>Graphic</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>26</td>
<td>35</td>
<td>20</td>
<td>ML</td>
<td>GP</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>11</td>
<td>19</td>
<td>5</td>
<td>GM</td>
<td>GP</td>
<td>Poorly Graded GRAVEL with silt and sand; medium dense, brown, damp</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179
DATE DRILLED: 1-10-11
LOCATION: See Location Diagram
ELEVATION: Not Determined

BORING NO. B-18
EQUIPMENT TYPE: Mobile B-80
DRILLING TYPE: 6"HSA
FIELD ENGINEER: C. Ege

MOISTURE CONTENT
(DRIED MT.
WATER MT.)
DRY DENSITY
(LBS/CU FT)
SAMPLE TYPE
SAMPLE COUNTS
DEPTH (FEET)
USCS
GRAPHIC

SOIL DESCRIPTION

TOPSOIL; Sandy SILT, stiff, brown, moist
Silty GRAVEL; dense, light brown, slightly damp, subrounded gravel up to 0.75" in diameter

M.L.
G.M.
28
24
14
7
3
7
5
10
15
20

@ 5 - loose

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179
PLATE A-21

WESTERN TECHNOLOGIES INC.

BORING LOG
**BORING NO. B-19**

**DATE DRILLED:** 1-10-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined  
**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6" HSA  
**FIELD ENGINEER:** C. Ege

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>MOISTURE (% of dry wt.)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>10 16 14</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>10</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>10 26 41</td>
<td>Sandy SILT; stiff, light brown, slightly damp</td>
</tr>
<tr>
<td>15</td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty SAND; medium dense, brown, slightly damp, subrounded gravel up to 0.5&quot; in diameter</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 6.5 FEET

**NOTES:** Groundwater Not Encountered

---

**WESTERN TECHNOLOGIES INC.**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-22

---

**N-** STANDARD PENETRATION TEST  
**R-** RING SAMPLE  
**NR-** NO SAMPLE RECOVERY  
**G-** GRAB SAMPLE  
**B-** BUCKET SAMPLE
<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (LBS/CF)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH FEET</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty GRAVEL; loose, light brown, slightly damp, subrounded gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>14 9 7</td>
<td>5</td>
<td>GM</td>
<td></td>
<td>Poorly Graded GRAVEL with silt and sand; loose, light brown, slightly damp, subrounded gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>MOISTURE CONTENT (lbm/ft³)</th>
<th>DRY DENSITY (lbm/ft³)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6</td>
<td>N</td>
<td>6</td>
<td>GP</td>
<td>6</td>
<td></td>
<td></td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>5 - 10</td>
<td>N</td>
<td>25</td>
<td>GP</td>
<td>15</td>
<td></td>
<td></td>
<td>Poorly Graded GRAVEL with sand; loose to medium dense, light brown, slightly damp, subrounded gravel up to 0.5&quot; in diameter</td>
</tr>
<tr>
<td>10 - 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER

**REF. NO.:** 6120JT179

**PLATE:** A-24

**WESTERN TECHNOLOGIES INC.**

**DATE DRILLED:** 1-10-11

**LOCATION:** See Location Diagram

**ELEVATION:** Not Determined

**EQUIPMENT TYPE:** Mobile B-80

**DRILLING TYPE:** 6"HSA

**FIELD ENGINEER:** C. Ege
**DATE DRILLED:** 1-10-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined

| BORING NO. B-22 | EQUIPMENT TYPE: Mobile B-80  
|                 | DRILLING TYPE: 6"HSA  
|                 | FIELD ENGINEER: C. Ege |

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td></td>
<td>N</td>
<td>27 41 47</td>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL: Sandy SILT with isolated gravel, stiff, brown, moist</td>
</tr>
<tr>
<td>GM</td>
<td></td>
<td>N</td>
<td>18 23 29</td>
<td></td>
<td></td>
<td></td>
<td>Silty GRAVEL: dense, light brown, slightly damp, subrounded to angular gravel up to 1&quot; in diameter</td>
</tr>
<tr>
<td>@ 5'- medium dense</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE A-25**
<table>
<thead>
<tr>
<th>Sample</th>
<th>Bore Counts</th>
<th>USCS</th>
<th>Graphic</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>25</td>
<td>ML</td>
<td>TOPSOIL: Sandy Silt with isolated gravel, stiff, brown, moist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>SP</td>
<td>Gravelly SAND: medium dense, brown, slightly damp</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>32</td>
<td></td>
<td></td>
<td>Silty GRAVEL: very dense, brown, dry</td>
</tr>
<tr>
<td>N</td>
<td>20 for 5'</td>
<td>GM</td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

**Notes:**
- Groundwater Not Encountered

**Locations and Sample Types:**
- N: Standard Penetration Test
- R: Ring Sample
- NR: No Sample Recovery
- G: Grab Sample
- B: Bucket Sample

**Project:** Eagle Mountain Retail Center
**Ref. No.:** 6120JT179
**Plate:** A-26
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>5-10</td>
<td>Silty SAND; medium dense, brown, slightly damp</td>
</tr>
<tr>
<td>10-15</td>
<td>Poorly Graded GRAVEL with silt and sand; medium dense, brown, slightly damp, surrounded gravel up to 1&quot; in diameter</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE</th>
<th>MOISTURE CONTENT</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>BLOW COUNTS</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>ML</td>
<td></td>
<td></td>
<td>20</td>
<td>ML</td>
<td></td>
<td>TOPSOIL; Sandy SILT, very stiff, light brown, moist</td>
</tr>
<tr>
<td>16</td>
<td>GM</td>
<td></td>
<td></td>
<td>14</td>
<td>GM</td>
<td></td>
<td>Silty GRAVEL; medium dense, light brown, slightly damp, subrounded to angular gravel</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td>19</td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 6.5 FEET</td>
</tr>
</tbody>
</table>

NOTES: Groundwater Not Encountered
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>MOISTURE CONTENT (% of DRY WT.)</th>
<th>DRY DENSITY (lbs/ft³)</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **TOPSOIL:** Sandy Silt, stiff, brown, moist
- **Silty SAND with gravel:** medium dense, brown, slightly damp
- **Gravelly SAND:** loose, brown, slightly damp, subrounded gravel

**BORING TERMINATED AT 6.5 FEET**

**NOTES:** Groundwater Not Encountered

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER
**REF. NO.:** 6120JT179

[Western Technologies Inc.]

**PLATE** A-29
**DATE DRILLED:** 1-10-11  **EQUIPMENT TYPE:** Mobile B-80  
**LOCATION:** See Location Diagram  
**DRILLING TYPE:** 6"HSA  
**ELEVATION:** Not Determined  
**FIELD ENGINEER:** C. Ege

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (lbs/cu ft)</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td>ML</td>
<td></td>
<td></td>
<td>13</td>
<td>23</td>
<td>ML</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>ML</td>
<td></td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td>Sandy SILT; very stiff to hard, light brown, dry</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>18</td>
<td>34</td>
<td></td>
<td>5</td>
<td>50</td>
<td>GP_GM</td>
<td>Poorly Graded GRAVEL with silt and sand; dense, brown, slightly damp</td>
</tr>
</tbody>
</table>

**NOTES: Groundwater Not Encountered**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE A-30**

**BORING LOG**
### Boring Log

**Boring No. B-28**

**Date Drilled:** 1-10-11  
**Location:** See Location Diagram  
**Elevation:** Not Determined  
**Equipment Type:** Mobile B-80  
**Drilling Type:** 6"HSA  
**Field Engineer:** C. Ege

<table>
<thead>
<tr>
<th>Moisture Content (%)</th>
<th>Dry Density (lbs/cu.ft)</th>
<th>Sample Type</th>
<th>Blow Counts</th>
<th>Depth (Feet)</th>
<th>U.S.C.S</th>
<th>Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>286</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>14</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Soil Description:**
  - **Topsoil:** Sandy SILT with isolated gravel, stiff, brown, moist
  - **Silty Gravel:** medium dense, light brown, slightly damp

**Boring Terminated at 6.5 Feet**

**Notes:** Groundwater Not Encountered

---

**Western Technologies Inc.**

**Project:** Eagle Mountain Retail Center  
**Ref. No.:** 6120JT179  
**Plate:** A-31
**DATE DRILLED:** 1-10-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined  

**BORING NO. B-29**  
**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6" HSA  
**FIELD ENGINEER:** C. Ege

<table>
<thead>
<tr>
<th>MOISTURE</th>
<th>DRY DENSITY</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (OF DRY WT.)</td>
<td>(LBS/CU FT)</td>
<td>SAMPLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 11 11</td>
<td>N 5 ML</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 9 8</td>
<td>N 10 ML</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **TOPSOIL:** Sandy SILT with isolated gravel, stiff, brown, moist
- **SILT:** stiff, light brown, slightly damp, CaCO3 veins, iron staining

**BORING TERMINATED AT 6.5 FEET**

---

**NOTES:** Groundwater Not Encountered

---

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-32

---

**WESTERN TECHNOLOGIES INC.**
## BORING NO. B-30

**DATE DRILLED:** 1-10-11  
**ELEVATION:** Not Determined  
**LOCATION:** See Location Diagram  
**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6"HSA  
**FIELD ENGINEER:** C. Ege

### Soil Description

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>USCS</th>
<th>Graphic</th>
<th>Sample</th>
<th>Blown Counts</th>
<th>MOISTURE (%)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ML</td>
<td></td>
<td>N</td>
<td>9</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>GM</td>
<td></td>
<td>N</td>
<td>14</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **TOPSOIL:** Sandy Silt, stiff, brown, moist
- **SILT:** Stiff, light brown, slightly damp, CaCO3 veins, iron staining
- **Silty GRAVEL:** Loose, light brown, dry, subrounded gravel

**BORING TERMINATED AT 6.5 FEET**

**NOTES:** Groundwater Not Encountered

---

**WESTERN TECHNOLOGIES INC.**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-33
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SAMPLE</th>
<th>BLOW COUNTS</th>
<th>MOISTURE CONTENT %</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>ML</td>
<td></td>
<td>N</td>
<td>66</td>
<td>10</td>
<td>9</td>
<td></td>
<td>TOPSOIL: Sandy SILT with isolated gravel, stiff, brown, moist</td>
</tr>
<tr>
<td>5</td>
<td>GM</td>
<td></td>
<td>N</td>
<td>56</td>
<td></td>
<td></td>
<td></td>
<td>Silty GRAVEL: loose, light brown, dry, gravel up to 0.5&quot; in diameter</td>
</tr>
<tr>
<td>20</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILT; firm, light brown, dry</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered
<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%) OF DRY WT.</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
<th>SOIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>8</td>
<td>ML</td>
<td>11</td>
<td>5</td>
<td>ML</td>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>GM</td>
<td>16</td>
<td>10</td>
<td>GM</td>
<td>SILT; medium dense, light brown, slightly damp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td>Silty GRAVEL; medium dense, slightly damp, light brown, sub-rounded gravel up to 0.5&quot; in diameter</td>
<td></td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179
PLATE A-35
**BORING NO. B-33**

**DATE DRILLED:** 1-10-11  
**LOCATION:** See Location Diagram  
**ELEVATION:** Not Determined  
**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6” HSA  
**FIELD ENGINEER:** C. Ege

**SOIL DESCRIPTION**

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (%) W/D</th>
<th>DRY DENSITY (lbs/cu ft)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOPSOIL; Sandy SILT, stiff, brown, moist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy SILT; stiff, light brown, slightly damp, CaCO3 veins, iron staining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>@ 5’ - firm, iron staining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 6.5 FEET**

---

**NOTES:** Groundwater Not Encountered

---

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-36

---

**WESTERN TECHNOLOGIES INC.**
# BORING LOG

**BORING NO. B-34**

**EQUIPMENT TYPE:** Mobile B-80  
**DRILLING TYPE:** 6"HSA  
**FIELD ENGINEER:** C. Ege

<table>
<thead>
<tr>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **TOPSOIL:** Sandy SILT, stiff, brown, moist
- **Sandy SILT:** stiff, light brown, slightly damp, CaCO3 veins

@ 5' - stiff to very stiff, iron staining

**BORING TERMINATED AT 6.5 FEET**

**NOTES:** Groundwater Not Encountered

---

**WESTERN TECHNOLOGIES INC.**

**PROJECT:** EAGLE MOUNTAIN RETAIL CENTER  
**REF. NO.:** 6120JT179  
**PLATE:** A-37
# Boring Log

**Location:** See Location Diagram

**Date Drilled:** 1-10-11

**Elevation:** Not Determined

### General Information
- **Project:** Eagle Mountain Retail Center
- **Ref. No.:** 61207J79
- **Boring No.:** B-35
- **Equipment Type:** Mobile B-80
- **Drilling Type:** 6-HSA
- **Field Engineer:** C. Ege

### Soil Description

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silty Gravel; very dense, light brown, slightly damp, angular gravel</td>
</tr>
<tr>
<td></td>
<td>Silty Silt with isolated gravel, stiff, brown, moist</td>
</tr>
</tbody>
</table>

### Soil Test Results

<table>
<thead>
<tr>
<th>Standard Penetration Test (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moisture Content (% of Dry Wt.)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dry Density (Lbs/Cu Ft)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Blow Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>45</td>
</tr>
<tr>
<td>10 ft.</td>
</tr>
</tbody>
</table>

### Notes
- Groundwater Not Encountered
DATE DRILLED: 1-10-11
LOCATION: See Location Diagram
ELEVATION: Not Determined

BORING NO. B-36
EQUIPMENT TYPE: Mobile B-80
DRILLING TYPE: 6"HSA
FIELD ENGINEER: C. Ege

<table>
<thead>
<tr>
<th>MOISTURE CONTENT</th>
<th>DRY DENSITY (LBS/CU FT)</th>
<th>SAMPLE TYPE</th>
<th>BLOW COUNTS</th>
<th>DEPTH (FEET)</th>
<th>USCS</th>
<th>GRAPHIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>% OF DRY WT.</td>
<td></td>
<td>ML</td>
<td>5</td>
<td>ML</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ML</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>26</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOIL DESCRIPTION

TOPSOIL; Sandy SILT, stiff, brown, moist

Sandy SILT; firm, brown, slightly damp

@ 5' - very stiff

BORING TERMINATED AT 6.5 FEET

NOTES: Groundwater Not Encountered

PROJECT: EAGLE MOUNTAIN RETAIL CENTER
REF. NO.: 6120JT179

PLATE

BORING LOG
**Boring No. B-37**

**Equipment Type:** Mobile B-80  
**Drilling Type:** 6" HSA  
**Field Engineer:** C. Ege

<table>
<thead>
<tr>
<th>Moisture Content (as of dry wt)</th>
<th>Dry Density (lbs/cu ft)</th>
<th>Sample Type</th>
<th>Sample</th>
<th>Blow Counts</th>
<th>Depth (feet)</th>
<th>USCS</th>
<th>Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>N</td>
<td>N</td>
<td>15</td>
<td>23 28 29 49</td>
<td>0 1 2 5 10</td>
<td>ML</td>
<td>GM</td>
</tr>
</tbody>
</table>

- **SOIL DESCRIPTION**
  - **Topsoil:** Sandy SILT with isolated gravel, stiff, brown, moist
  - **Silty Gravel:** Medium dense to dense, light brown, slightly damp, subrounded to angular gravel up to 1" in diameter

**Boring Terminated at 6.5 Feet**

**Notes:** Groundwater Not Encountered

---

**Summary:**

- **Standard Penetration Test**
  - **R:** Ring Sample
  - **NR:** No Sample Recovery
  - **G:** Grab Sample
  - **B:** Bucket Sample
<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Depth (ft.)</th>
<th>Soil Class.</th>
<th>Initial Dry Density (pcf)</th>
<th>Initial Water Content (%)</th>
<th>Compression Properties</th>
<th>Plasticity</th>
<th>Particle Size Distribution (%) Passing by Weight</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surcharge (KSF)</td>
<td>Total Compression (%)</td>
<td>Liquid Limit</td>
<td>Plasticity Index</td>
</tr>
<tr>
<td>B-2</td>
<td>5</td>
<td>GM</td>
<td>2.3</td>
<td></td>
<td></td>
<td>--</td>
<td>NP</td>
<td>73</td>
</tr>
<tr>
<td>B-2</td>
<td>15</td>
<td>GC-GM</td>
<td>15.5</td>
<td></td>
<td></td>
<td>26</td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>B-4</td>
<td>5</td>
<td>CL</td>
<td>12.8</td>
<td></td>
<td></td>
<td>32</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>B-4</td>
<td>10</td>
<td>GM</td>
<td>2.6</td>
<td></td>
<td></td>
<td>19</td>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>B-5</td>
<td>5</td>
<td>ML</td>
<td>93.6</td>
<td>17.6</td>
<td>0.4</td>
<td>-0.92</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.8</td>
<td>-1.44</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.7</td>
<td>-2.31</td>
<td>-8.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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**Note:** Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

**NP** = Non-Plastic

**Remarks**
1. Compacted density (approx. 95% of ASTM D1557 (max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
4. Sample disturbance observed.
## SOIL PROPERTIES

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<tr>
<th>Boring No.</th>
<th>Depth (ft.)</th>
<th>Soil Class.</th>
<th>Initial Dry Density (pcf)</th>
<th>Initial Water Content (%)</th>
<th>Compression Properties</th>
<th>Plasticity</th>
<th>Particle Size Distribution (% Pass by Weight)</th>
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**Compression Properties**
- **Surcharge (KSF):**
  - In-Situ
  - After Saturation
- **Total Compression (%):**
  - 35
  - 14

**Plasticity**
- **Liquid Limit:**
  - 35
- **Plasticity Index:**
  - 14

**Particle Size Distribution (% Pass by Weight)**
- **3/4**: 96
- **#4**: 
- **#10**: 
- **#40**: 
- **#200**: 

---

**Note:** Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

**NP = Non-Plastic**

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2. Submerged to approximate saturation.
4. Sample disturbance observed.

---

**EAGLE MOUNTAIN RETAIL CENTER**

**Soil Properties**

**WESTERN TECHNOLOGIES INC.**

**Job No. 6120JT179**

**Plate: B-2**
### Soil Properties

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<th>Initial Water Content (%)</th>
<th>Compression Properties</th>
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Remarks
1. Compacted density (approx. 95% of ASTM D1557 (max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
4. Sample disturbance observed.
**INORGANIC ANALYTICAL REPORT**

Client: Western Technologies, Inc.  
Project: Eagle Mt. Retail / 6141 PO011  
Lab Sample ID: 1101120-001  
Client Sample ID: 6120JT179 B-1 @ 2.5'  
Collection Date: 1/4/2011  
Received Date: 1/10/2011 1254h

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<th>Date Analyzed</th>
<th>Method Used</th>
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<td>A4500-SO4-E</td>
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<td>13.0</td>
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</tr>
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* & - Analysis is performed on a 1:1 DI water extract for soils.

---

463 West 3600 South  
Salt Lake City, UT  
84115

(801) 263-8686  
Toll Free (888) 263-8686  
Fax (801)263-8687  
email: awal@awal-labs.com

Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

Report Date: 1/12/2011  Page 2 of 3
INORGANIC ANALYTICAL REPORT

Client: Western Technologies, Inc.  Contact: Warren Clyde
Project: Eagle Mt. Retail / 6141 PO011
Lab Sample ID: 1101120-002
Client Sample ID: 6120JT179 B-14 @ 2.5-4'
Collection Date: 1/9/2011
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email: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer
1.1 BID INFORMATION

A. Bidder: _____________________________________________________.

B. Project Name: PORTERS CROSSING - PAD ‘B’ BUILDING.

C. Project Location: 4095 E. Pony Express Parkway, Eagle Mountain, Utah.

D. Owner: Pony Express Land Development, Inc.


F. Architect Project Number: 16016.

1.2 CERTIFICATIONS AND BASE BID

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

1. ___________________________ Dollars ($______________).

1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 30 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier’s check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. ___________________________ Dollars ($______________).

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

A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. Concrete Work: ________________________________________________________.
2. Masonry Work: ________________________________________________________.
3. Roofing Work: ________________________________________________________.
4. Plumbing Work: ________________________________________________________.
5. HVAC Work: __________________________________________________________.
6. Electrical Work: ________________________________________________________.

1.5 **TIME OF COMPLETION**

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within 180 calendar days.

1.6 **ACKNOWLEDGEMENT OF ADDENDA**

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

1. Addendum No. 1, dated ____________________.
2. Addendum No. 2, dated ____________________.
3. Addendum No. 3, dated ____________________.
4. Addendum No. 4, dated ____________________.

1.7 **BID SUPPLEMENTS**

A. The following supplements are a part of this Bid Form and are attached hereto.

1. Bid Form Supplement - Allowances.
2. Bid Form Supplement - Bid Bond Form (AIA Document A310).

1.8 **CONTRACTOR'S LICENSE**

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

1.9 **SUBMISSION OF BID**

A. Respectfully submitted this ____ day of ____________, 2017.
B. Submitted By: ________________________________ (Name of bidding firm or corporation).

C. Authorized Signature: ________________________________ (Handwritten signature).

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

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

F. Witness By: ________________________________ (Handwritten signature).

G. Attest: ________________________________ (Handwritten signature).

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

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

J. Street Address: ________________________________________________________________.

K. City, State, Zip: ______________________________________________________________.

L. Phone: ________________________________________________________________.

M. License No.: ______________________________________________________________.

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

END OF DOCUMENT 00 41 13
1.1 BID FORM SUPPLEMENT

A. A completed Proposed Schedule of Values form is required to be attached to the Bid Form.

1.2 PROPOSED SCHEDULE OF VALUES FORM

A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.
1.1 BID INFORMATION

A. Bidder: <Insert successful bidder name>.
B. Bidder’s Address: <Insert street address, city, state, zip, and telephone>.
C. Prime Contract: <Insert prime contract name>.
D. Project Name: PORTERS CROSSING – PAD ‘B’ BUILDING.
E. Project Location: 4095 E. Pony Express Parkway, Eagle Mountain, Utah 84005.
F. Owner: Pony Express Land Development, Inc.
H. Architect Project Number: 16016.

1.2 NOTICE OF AWARD OF CONTRACT

1. Notice: The above Bidder is hereby notified that their bid, dated <Insert date>, for the above Contract has been considered and the Bidder is hereby awarded a contract for New four story mixed-use building including site improvements.

B. Contract Sum: The Contract Sum is <Insert written amount> dollars ($<Insert numeric amount>).

1.3 EXECUTION OF CONTRACT

A. Contract Documents: Copies of the Contract Documents will be made available to the Bidder immediately. The Bidder must comply with the following conditions precedent within 10 days of the above date of issuance of the Notice:

1. Deliver to Owner three sets of fully executed copies of the Contract Documents.
2. Deliver with the executed Contract Documents Bonds and Certificates of Insurance required by the Contract Documents.

B. Compliance: Failure to comply with conditions of this Notice within the time specified will entitle Owner to consider the Bidder in default, annul this Notice, and declare the Bidder’s Bid security forfeited.

1. Within 10 days after the Bidder complies with the conditions of this Notice, Owner will return to the Bidder one fully executed copy of the Contract Documents.
1.4 NOTIFICATION

A. This Notice is issued by:

1. Owner:______________________________________________________________.

2. Authorized Signature:____________________________________(Handwritten signature).

3. Signed By:__________________________________________ (Type or print name).

4. Title:____________________________________(Owner/Partner/President/Vice President).

END OF DOCUMENT 00 51 00
## DIVISION 01 – GENERAL REQUIREMENTS

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<th>Section</th>
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<tr>
<td>01 10 00</td>
<td>SUMMARY</td>
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<td>01 26 00</td>
<td>CONTRACT MODIFICATION PROCEDURES</td>
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<td>01 29 00</td>
<td>PAYMENT PROCEDURES</td>
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<td>PROJECT MANAGEMENT AND COORDINATION</td>
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SECTION 01 10 00 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Project Information.
2. Work Covered by Contract Documents.
3. Owner-Furnished Products.
4. Access to Site.
5. Progress Cleaning.
6. Work Restrictions.
7. Specification Formats and Conventions.

B. Related Sections include the following:

1. Section 01 50 00 “Temporary Facilities and Controls” for limitations and procedures governing temporary use of Owner’s facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Porters Crossing Pad ‘B’ Building.

   1. Project Location: 4095 East Pony Express Parkway, Eagle Mountain, Utah 84005.

B. Owner: Pony Express Land Development, Inc. – 630 E. South Temple, Utah 84102.


1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

   1. The project consists of a one-story retail pad “core & Shell” building for a mid-box tenant of approximately 20,000 sq. ft., with an additional second story leasable office space of approximately 9,500 sq. ft. The building core improvements to include the following: Entrance/Lobby on ground floor, Elevator, Elevator Machine Room, Electric Room,
Corridor. Second Level core to include: Lobby, Men’s and Women’s Restrooms, Custodial, Corridor, Network Room and Stairs.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated on drawings. The Work includes providing support systems to receive Owner’s equipment and electrical connections.

1.6 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor’s use of Project site is limited only by Owner’s right to perform work or to retain other Contractors on portions of Project.

1.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Dispose of materials lawfully. Maintain Project site free of waste materials and debris.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, except otherwise indicated. Permission must be given from General Contractor to work outside these hours.

1. Weekend Hours: Coordinate with General Contractor.
2. Early Morning Hours: Prior to 7:00 a.m. shall be non-noise generating activities.

C. Drug Free Site: Use of controlled substances are not permitted on the Project Site.

1.9 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI/CSC’s ‘MasterFormat’ numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

   a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00
SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Section 01 60 00 “Product Requirements” for administrative procedures for handling requests for substitutions made after Contract award.

1.3 PROPOSAL REQUESTS

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

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within 14 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor’s Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor’s Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section “Product Requirements” if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES


1.5 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00
SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor’s Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.
c. Contractor’s Construction Schedule.

2. Submit the Schedule of Values to Architect through Construction Manager at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

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

1. Identification: Include the following Project identification on the Schedule of Values:

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

2. Submit draft of AIA Document G703 Continuation Sheets.

3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

   1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

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

10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
1.5 APPLICATIONS FOR PAYMENT

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

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

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

C. Payment Application Times: Progress payments shall be submitted to Architect by the fifth day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.


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

1. Entries shall match data on the Schedule of Values and Contractor’s Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

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

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

1. List of subcontractors.
2. Schedule of Values.
3. Contractor’s Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
7. List of Contractor’s staff assignments.
8. List of Contractor’s principal consultants.
11. Initial progress report.
13. Certificates of insurance and insurance policies.
15. Data needed to acquire Owner’s insurance.
16. Initial settlement survey and damage report if required.

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

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

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, “Contractor’s Affidavit of Payment of Debts and Claims.”
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00
SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination Drawings.
   2. Administrative and supervisory personnel.
   3. Project meetings.
   4. Requests for Interpretation (RFIs).
B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
C. Related Sections include the following:
   1. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   2. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS
A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION
A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.5 SUBMITTALS

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

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

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three (3) days of the meeting.
B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than fifteen (15) days after execution of the Agreement. Hold the conference at Project site. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
   
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Procedures for processing field decisions and Change Orders.
   f. Procedures for RFIs.
   g. Procedures for testing and inspecting.
   h. Procedures for processing Applications for Payment.
   i. Distribution of the Contract Documents.
   j. Submittal procedures.
   k. Preparation of Record Documents.
   l. Use of the premises.
   m. Work restrictions.
   n. Owner’s occupancy requirements.
   o. Responsibility for temporary facilities and controls.
   q. Parking availability.
   r. Office, work, and storage areas.
   s. Equipment deliveries and priorities.
   t. First aid.
   u. Security.
   v. Progress cleaning.
   w. Working hours.

3. Minutes: Record and distribute meeting minutes.

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

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

      1) Review schedule for next period.

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

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

3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

   a. Schedule Updating: Revise Contractor’s Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at monthly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

   1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

   2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

      b. Schedule Updating: Revise Combined Contractor’s Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

      c. Review present and future needs of each contractor present, including the following:

         1) Sequence of operations.
         2) Status of submittals.
         3) Deliveries.
         4) Off-site fabrication.
         5) Access.
         6) Site utilization.
         7) Temporary facilities and controls.
         8) Work hours.
         9) Hazards and risks.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Change Orders.

   3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
1.8 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor’s work or work of subcontractors.

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

1. Project name.
2. Date.
3. Name of Contractor.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor’s suggested solution(s). If Contractor’s solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor’s signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Architect’s Action: Architect will review each RFI, determine action required, and return it. Allow seven (7) working days for Architect’s response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Architect’s actions on submittals.
   f. Incomplete RFIs or RFIs with numerous errors.

2. Architect’s action may include a request for additional information, in which case Architect’s time for response will start again.
3. Architect’s action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section “Contract Modification Procedures.”
a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten (10) days of receipt of the RFI response.

D. On receipt of Architect’s action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five (5) days if Contractor disagrees with response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect’s response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00
SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Start-up construction schedule.
2. Contractor’s construction schedule.
3. Daily construction reports.
4. Material location reports.
5. Field condition reports.
6. Special reports.

B. Related Sections:

1. Section 01 33 00 “Submittal Procedures” for submitting schedules and reports.
2. Section 01 40 00 “Quality Requirements” for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

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

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

B. 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 the 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. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.
   1. Float time is shared between the Owner and the Contractor for the benefit of the project.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. PDF electronic file.
   2. Six (6) paper copies.

B. Start-up construction schedule.

C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

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

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, 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 commencement of the Work until most recent Application for Payment.

F. Daily Construction Reports: Submit at monthly intervals.

G. Material Location Reports: Submit at monthly intervals.

H. Field Condition Reports: Submit at time of discovery of differing conditions.
I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect’s request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor’s construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages, area separations, interim milestones and Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for completion and startup procedures.
8. Review and finalize list of construction activities to be included in schedule.
9. Review submittal requirements and procedures.
10. Review procedures for updating schedule.

1.6 COORDINATION

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

B. 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 commencement of the Work to date of Substantial Completion and 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 principal element of the Work. Comply with the following:

1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

2. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.

3. Startup and Testing Time: Include not less than thirty (30) days for startup and testing.

4. 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.

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. Phasing: Arrange list of activities on schedule by phase.

2. Work under More Than One Contract: Include a separate activity for each contract.

3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

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

   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Partial occupancy before Substantial Completion.
   d. Use of premises restrictions.
   e. Seasonal variations.
   f. Environmental control.

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

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

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

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

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

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 RFIs.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.

F. Recovery Schedule: When periodic update indicates the Work is 14 (fourteen) 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. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

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

2.2 START-UP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven (7) days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
2.3 **CONTRACTOR’S CONSTRUCTION SCHEDULE (CPM SCHEDULE)**

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

B. **Start-up Network Diagram:** Submit diagram within fourteen (14) 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 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 sixty (60) 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. Conduct educational workshops to train and inform key Project personnel, including subcontractors’ personnel, in proper methods of providing data and using CPM schedule information.

3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use ‘one workday’ as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.

D. **CPM Schedule Preparation:** Prepare a list of all activities required to complete the Work. Using the start-up 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.

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. Principal 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.

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.
5. Changes in the critical path.
6. Changes in total float or slack time.

2.4 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 (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
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. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

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

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one (1) day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

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

PART 3 - EXECUTION

3.1 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. Contractor’s Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule each month 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 32 00
SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Sections:

1. Section 01 33 00 “Submittal Procedures” for submitting photographic documentation.
2. Section 01 77 00 “Closeout Procedures” for submitting photographic documentation as project record documents at Project closeout.
3. Section 01 79 00 “Demonstration and Training” for submitting video recordings of demonstration of equipment and training of Owner’s personnel.
4. Section 31 10 00 “Site Clearing” for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three (3) days of taking photographs.

1. Digital Camera: Minimum sensor resolution of eight (8) megapixels.
2. Format: Minimum 1600 by 1200 pixels, 400 dpi minimum, in unaltered original files, with same aspect ratio as the sensor, uncropped, date- and time- stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:
   a. Name of Project.
   b. Name and contact information for photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and
elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

C. Construction Photographs: Submit two (2) prints of each photographic view within seven (7) days of taking photographs.

1. Format: 8.5-by-11-inch standard 20 lb. copy copy, enclosed back to back in clear plastic sleeves that are punched for standard three-ring binder.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
   a. Name of Project.
   b. Name and contact information for photographer.
   c. Name of Architect.
   d. Name of Contractor.
   e. Date photograph was taken if not date stamped by camera.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Unique sequential identifier keyed to accompanying key plan.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of eight (8) megapixels, and at an image resolution of not less than 1600 by 1200 pixels and 400 dpi.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: General Contractor to take construction photographs.
B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in file name for each image.
   2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

D. Preconstruction Photographs: Before commencement of excavation, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
   1. Flag construction limits before taking construction photographs.
   2. Take 10 photographs to show existing conditions adjacent to property before starting the Work.
   3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take 10 photographs monthly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Time-Lapse Sequence Construction Photographs: Take 10 photographs as indicated, to show status of construction and progress since last photographs were taken.
   1. Frequency: Take photographs monthly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment.
   2. Vantage Points: Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time to create a time-lapse sequence as follows:
      a. Commencement of the Work, through completion of subgrade construction.
      b. Above-grade structural framing.
      c. Exterior building enclosure.
      d. Interior Work, through date of Substantial Completion.
H. Final Completion Construction Photographs: Take 10-20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

1. Do not include date stamp.

I. Additional Photographs: Owner may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

   a. Special events planned at Project site.
   b. Immediate follow-up when on-site events result in construction damage or losses.
   c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
   d. Substantial Completion of a major phase or component of the Work.
   e. Extra record photographs at time of final acceptance.
   f. Owner’s request for special publicity photographs.

END OF SECTION 01 32 33
SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Section 01 29 00 “Payment Procedures” for submitting Applications for Payment and the Schedule of Values.
2. Section 01 32 00 “Construction Progress Documentation” for submitting schedules and reports, including Contractor’s construction schedule.
3. Section 01 78 23 “Operation and Maintenance Data” for submitting operation and maintenance manuals.
4. Section 01 78 39 “Project Record Documents” for submitting record Drawings, record Specifications, and record Product Data.
5. Section 01 79 00 “Demonstration and Training” for submitting video recordings of demonstration of equipment and training of Owner’s personnel.

C. Shop drawing and product data submittals shall be transmitted to Architect in electronic (PDF) format using Bluebeam.

D. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

E. The electronic submittal process is not intended for color samples, color charts, or physical material samples.

1. Contractor will be required to provide two (2) physical samples of color samples, color charts, or physical material samples for color selection and approval of product as required by Specification Section.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect’s responsive action. Action submittals are those submittals indicated in individual Specification Sections as “action submittals.”
B. **Informational Submittals**: Written and graphic information and physical samples that do not require Architect’s responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as “informational submittals.”

### 1.4 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. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor’s construction schedule.
2. **Initial Submittal**: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. **Final Submittal**: Submit concurrently with the first complete submittal of Contractor’s construction schedule.
   
   a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

### 1.5 ELECTRONIC SUBMITTAL PROCEDURES

A. Contractor may use any or all of the following options:

1. **Subcontractors and Suppliers** provide electronic (PDF) submittals to Contractor via Bluebeam.
2. **Subcontractors and Suppliers** provide paper submittals to General Contractor who electronically scans and converts to PDF format.
3. **Subcontractors and Suppliers** provide paper submittals to Scanning Service which electronically scans and converts to PDF format.

B. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents, including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.

C. Contractor shall transmit each submittal to Architect using Bluebeam.

D. Architect/Engineer review comments will be made available on via Bluebeam.

E. Distribution of reviewed submittals to Subcontractors and Suppliers is the responsibility of the Contractor.
1.6 **SUBMITTAL ADMINISTRATIVE REQUIREMENTS**

A. **Architect's Digital Data Files:** At Contractor's request, electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Contractor will need to conform to electronic release stamp of Architect’s Contract Drawings. Drawings are not to be used as Construction Documents.

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

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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. 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. **Submittals Schedule:** Comply with requirements in Division 01 Section “Construction Progress Documentation” for list of submittals and time requirements for scheduled performance of related construction activities.

D. **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 15 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 15 days for review of each resubmittal.

4. **Sequential Review:** Where sequential review of submittals by Architect’s Consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. **Concurrent Consultant Review:** Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect’s Consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
E. Resubmittals: Make resubmittals in same form as initial submittal.

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

F. Use for Construction: Use only final submittals with mark indicating “Insert approval notation from Architect’s (and Contractor’s) action stamp” taken by Architect.

PART 2 - PRODUCTS

2.1 GENERAL SUBMITTAL PROCEDURE:

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

2. All submittals, required by the same Section, are to be submitted separately. Contractor is not to submit all submittals, required by the same Section, as a combined package.

B. 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.
   a. Number of Samples: Submit two (2) sets of Samples. Architect will retain one Sample set; remainder will be returned. Contractor to keep one (1) sample at Project Site for verification and product color coordination.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
   b. 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 appropriate Specification Section.
      e. Specification paragraph number and generic name of each item.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. 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.

5. 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 one (1) 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 submittal with options selected.

6. 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.

C. 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. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
   a. PDF electronic file.

D. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 “Project Management and Coordination.”

E. Contractor’s Construction Schedule: Comply with requirements specified in Division 01 Section “Construction Progress Documentation” for Contractor’s action.

F. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 “Payment Procedures.”
G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 “Quality Requirements.”

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 “Closeout Procedures.”

I. Maintenance Data: Comply with requirements specified in Section 017823 “Operation and Maintenance Data.”

J. 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.

K. 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.

L. 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.

M. 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.

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

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

P. 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.

Q. 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.

R. 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. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers’ names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

S. 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.

T. 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.

U. 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.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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 taken, as follows:

1. No exception taken.
2. Make Corrections Noted.
3. Rejected.
4. Revise and Resubmit.
5. Submit Specified Item.

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. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

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

F. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00
SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. 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. Section 01 73 29 'Cutting and Patching' for repair and restoration of construction disturbed by testing and inspecting activities.

2. Divisions 02 through 48 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 or Construction Manager.
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. 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.

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

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

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

H. 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.

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.
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. 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 (7) 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 five (5) 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.

J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 48.
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. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. 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.

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 twenty-four (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 01 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.


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 within thirty (30) days of date established for Commencement of the Work.

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 special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency and special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, 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 01 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 40 00
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as 'indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied
directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale’s "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
15. AIA - American Institute of Architects (The); www.aia.org.
<table>
<thead>
<tr>
<th>No.</th>
<th>Organization Name</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>APA - APA - The Engineered Wood Association;</td>
<td><a href="http://www.apawood.org">www.apawood.org</a></td>
</tr>
<tr>
<td>23</td>
<td>APA - Architectural Precast Association;</td>
<td><a href="http://www.archprecast.org">www.archprecast.org</a></td>
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<tr>
<td>24</td>
<td>API - American Petroleum Institute;</td>
<td><a href="http://www.api.org">www.api.org</a></td>
</tr>
<tr>
<td>25</td>
<td>ARI - Air-Conditioning &amp; Refrigeration Institute;</td>
<td>(See AHRI).</td>
</tr>
<tr>
<td>26</td>
<td>ARI - American Refrigeration Institute;</td>
<td>(See AHRI).</td>
</tr>
<tr>
<td>27</td>
<td>ARMA - Asphalt Roofing Manufacturers Association;</td>
<td><a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a></td>
</tr>
<tr>
<td>28</td>
<td>ASCE - American Society of Civil Engineers;</td>
<td><a href="http://www.asce.org">www.asce.org</a></td>
</tr>
<tr>
<td>29</td>
<td>ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute;</td>
<td>(See ASCE).</td>
</tr>
<tr>
<td>30</td>
<td>ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers;</td>
<td><a href="http://www.ashrae.org">www.ashrae.org</a></td>
</tr>
<tr>
<td>31</td>
<td>ASME - ASME International; (American Society of Mechanical Engineers);</td>
<td><a href="http://www.asme.org">www.asme.org</a></td>
</tr>
<tr>
<td>32</td>
<td>ASSE - American Society of Safety Engineers (The);</td>
<td><a href="http://www.asse.org">www.asse.org</a></td>
</tr>
<tr>
<td>33</td>
<td>ASSE - American Society of Sanitary Engineering;</td>
<td><a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a></td>
</tr>
<tr>
<td>34</td>
<td>ASTM - ASTM International; (American Society for Testing and Materials International);</td>
<td><a href="http://www.astm.org">www.astm.org</a></td>
</tr>
<tr>
<td>35</td>
<td>ATIS - Alliance for Telecommunications Industry Solutions;</td>
<td><a href="http://www.atis.org">www.atis.org</a></td>
</tr>
<tr>
<td>36</td>
<td>AWEA - American Wind Energy Association;</td>
<td><a href="http://www.awea.org">www.awea.org</a></td>
</tr>
<tr>
<td>37</td>
<td>AWI - Architectural Woodwork Institute;</td>
<td><a href="http://www.awinet.org">www.awinet.org</a></td>
</tr>
<tr>
<td>38</td>
<td>AWMAC - Architectural Woodwork Manufacturers Association of Canada;</td>
<td><a href="http://www.awmac.com">www.awmac.com</a></td>
</tr>
<tr>
<td>39</td>
<td>AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association);</td>
<td><a href="http://www.awpa.com">www.awpa.com</a></td>
</tr>
<tr>
<td>40</td>
<td>AWS - American Welding Society;</td>
<td><a href="http://www.aws.org">www.aws.org</a></td>
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<tr>
<td>41</td>
<td>AWWA - American Water Works Association;</td>
<td><a href="http://www.awwa.org">www.awwa.org</a></td>
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<tr>
<td>42</td>
<td>BHMA - Builders Hardware Manufacturers Association;</td>
<td><a href="http://www.buildershardware.com">www.buildershardware.com</a></td>
</tr>
<tr>
<td>43</td>
<td>BIA - Brick Industry Association (The);</td>
<td><a href="http://www.gobrick.com">www.gobrick.com</a></td>
</tr>
<tr>
<td>44</td>
<td>BICSI - BICSI, Inc.;</td>
<td><a href="http://www.bicsi.org">www.bicsi.org</a></td>
</tr>
<tr>
<td>45</td>
<td>BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association);</td>
<td><a href="http://www.bifma.com">www.bifma.com</a></td>
</tr>
<tr>
<td>46</td>
<td>BISSC - Baking Industry Sanitation Standards Committee;</td>
<td><a href="http://www.bissc.org">www.bissc.org</a></td>
</tr>
<tr>
<td>47</td>
<td>BWF - Badminton World Federation; (Formerly: International Badminton Federation);</td>
<td><a href="http://www.bwfbadminton.org">www.bwfbadminton.org</a></td>
</tr>
<tr>
<td>48</td>
<td>CDA - Copper Development Association;</td>
<td><a href="http://www.copper.org">www.copper.org</a></td>
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<tr>
<td>49</td>
<td>CEA - Canadian Electricity Association;</td>
<td><a href="http://www.electricity.ca">www.electricity.ca</a></td>
</tr>
<tr>
<td>50</td>
<td>CEA - Consumer Electronics Association;</td>
<td><a href="http://www.ce.org">www.ce.org</a></td>
</tr>
<tr>
<td>51</td>
<td>CFFA - Chemical Fabrics &amp; Film Association, Inc.;</td>
<td><a href="http://www.chemicalfabricsandfilm.com">www.chemicalfabricsandfilm.com</a></td>
</tr>
<tr>
<td>52</td>
<td>CFSEI - Cold-Formed Steel Engineers Institute;</td>
<td><a href="http://www.cfsei.org">www.cfsei.org</a></td>
</tr>
<tr>
<td>53</td>
<td>CGA - Compressed Gas Association;</td>
<td><a href="http://www.cganet.com">www.cganet.com</a></td>
</tr>
<tr>
<td>54</td>
<td>CIMA - Cellulose Insulation Manufacturers Association;</td>
<td><a href="http://www.cellulose.org">www.cellulose.org</a></td>
</tr>
<tr>
<td>55</td>
<td>CISCA - Ceilings &amp; Interior Systems Construction Association;</td>
<td><a href="http://www.cisca.org">www.cisca.org</a></td>
</tr>
<tr>
<td>56</td>
<td>CISPI - Cast Iron Soil Pipe Institute;</td>
<td><a href="http://www.cispi.org">www.cispi.org</a></td>
</tr>
<tr>
<td>57</td>
<td>CLFMI - Chain Link Fence Manufacturers Institute;</td>
<td><a href="http://www.chainlinkinfo.org">www.chainlinkinfo.org</a></td>
</tr>
<tr>
<td>58</td>
<td>CPA - Composite Panel Association;</td>
<td><a href="http://www.pbmdf.com">www.pbmdf.com</a></td>
</tr>
<tr>
<td>59</td>
<td>CRI - Carpet and Rug Institute (The);</td>
<td><a href="http://www.carpet-rug.org">www.carpet-rug.org</a></td>
</tr>
<tr>
<td>60</td>
<td>CRRC - Cool Roof Rating Council;</td>
<td><a href="http://www.coolroofs.org">www.coolroofs.org</a></td>
</tr>
<tr>
<td>61</td>
<td>CRSI - Concrete Reinforcing Steel Institute;</td>
<td><a href="http://www.crsi.org">www.crsi.org</a></td>
</tr>
</tbody>
</table>
62. CSA - Canadian Standards Association; www.csa.ca.
63. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
64. CSI - Construction Specifications Institute (The); www.csinet.org.
65. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
66. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
67. CWC - Composite Wood Council; (See CPA).
69. DHI - Door and Hardware Institute; www.dhi.org.
70. ECA - Electronic Components Association; (See ECIA).
71. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
72. ECIA - Electronic Components Industry Association; www.eciaonline.org
73. EIA - Electronic Industries Alliance; (See TIA).
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
86. GA - Gypsum Association; www.gypsum.org.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
95. IAS - International Accreditation Service; www.iasonline.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
118. LMA - Laminating Materials Association; (See CPA).
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - InterNational Electrical Testing Association; www.netaworld.org.
141. NFHS - National Federation of State High School Associations; www.nfhs.org.
143. NFPA - NFPA International; (See NFPA).
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.
156. PCI - Precast/Prestressed Concrete Institute; www pci.org.
158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors’ National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
188. TPI - Truss Plate Institute; www.tpinst.org.
190. TRI - Tile Roofing Institute; (Formerly: National Tile Roofing Manufacturing Association); www.tileroofing.org.
191. UBC - Uniform Building Code; (See ICC).
194. USAV - USA Volleyball; www.usavolleyball.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
204. WPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Section 01 10 00 "Summary" for limitations on utility interruptions and other work restrictions.
2. Section 01 33 00 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Section 01 73 00 "Execution" for progress cleaning requirements.
4. Divisions 02 through 48 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum, unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner’s construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

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

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

1.7 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

C. Lumber and Plywood: Comply with requirements in Division 06 Section “Rough Carpentry.”

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
B. **Common-Use Field Office:** Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of ten (10) individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack board.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. **Storage and Fabrication Sheds:** Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

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

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

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

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

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

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

A. General: Install temporary service.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

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

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

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

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service overhead, unless otherwise indicated.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   2. Install lighting for Project identification sign.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one (1) telephone line for each field office.
   1. Provide additional telephone lines for the following:
      a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
   2. At each telephone, post a list of important telephone numbers.
a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

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

J. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install sub-base and base for temporary roads and paved areas according to Division 31 Section “Earth Moving.”
3. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
4. Recondition base after temporary use, including removing contaminated material, re-grading, proof-rolling, compacting, and testing according to “Division 32 – Exterior Improvements” or delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion according to “Division 32 – Exterior Improvements”.

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

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
D. Parking: Construction personnel will need to park vehicles off site to allow parking area for owner’s limited business operation on site.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
   1. Provide temporary, directional signs for construction personnel and visitors.
   2. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section “Construction Waste Management and Disposal.”

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.

I. Temporary Elevator Use: Use of elevator, for construction purposes, is not permitted without prior approval of Owner and Architect.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Division 01 Section "Summary."

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

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

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

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

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

1. Prohibit smoking in hazardous fire-exposure and construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
3.5  OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

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

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section “Closeout Procedures.”

END OF SECTION 01 50 00
SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This 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; product substitutions; and comparable products.

B. Related Sections include the following:

1. Section 01 42 00 “References” for applicable industry standards for products specified.
2. Section 01 77 00 “Closeout Procedures” for submitting warranties for Contract closeout.
3. Divisions 02 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased 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, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer’s product is named and accompanied by the words "basis of design," 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 other named manufacturers.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer’s name and proprietary product names for each product.

1. Coordinate product list with Contractor’s Construction Schedule and the Submittals Schedule.

2. Form: Tabulate information for each product under the following column headings:
   a. Specification Section number and title.
   b. Generic name used in the Contract Documents.
   c. Proprietary name, model number, and similar designations.
   d. Manufacturer’s name and address.
   e. Supplier’s name and address.
   f. Installer’s name and address.
   g. Projected delivery date or time span of delivery period.
   h. Identification of items that require early submittal approval for scheduled delivery date.

3. Initial Submittal: Within thirty (30) days after date of commencement of the Work, submit three (3) copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.

   a. At Contractor’s option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Completed List: Within sixty (60) days after date of Commencement of the Work, submit three (3) copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

5. Architect’s Action: Architect will respond in writing to Contractor within fifteen (15) days of receipt of completed product list. Architect’s response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect’s response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. 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. Substitution Request Form: Use form provided by Owner.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate Contractors, that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

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 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 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.

3. 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 fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

   a. Form of Acceptance: Change Order.
   b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Comparable Product 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. 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 fifteen (15) 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 Division 01 Section “Submittal Procedures.”
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section “Submittal Procedures.” Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. 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 ensure compliance with the Contract Documents and to ensure 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. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer’s written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner’s construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

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

1. Manufacturer’s Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer’s warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final 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 appropriate form properly executed.
3. Refer to Divisions 02 through 48 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section “Closeout Procedures.”

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that 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. Where products are accompanied by the term "match sample," sample to be matched is Architect’s.
7. **Or Equal:** Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. **Product Selection Procedures:**

1. **Product:** Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. **Manufacturer/Source:** Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. **Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. **Manufacturers:** Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. **Available Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. **Available Manufacturers:** Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. **Basis-of-Design Product:** Where Specifications name a product and include a list of manufacturers, provide the specified 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 provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect’s sample. Architect’s decision will be final on whether a proposed product matches.
   a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer’s colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
   a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or a similar phrase, Architect will select color, pattern, density, or texture from manufacturer’s product line that does not include premium items.
b. Full Range: Where Specifications include the phrase “full range of colors, patterns, textures” or similar phrase, Architect will select color, pattern, density, or texture from manufacturer’s product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within thirty (30) days after Commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

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

1. 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.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor’s Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. 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.

2.3 COMPARABLE PRODUCTS

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

1. Evidence that the proposed product does not require extensive 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 60 00
SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

2. Field engineering and surveying.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Section 01 33 00 "Submittal Procedures" for submitting surveys.
2. Section 01 73 29 "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

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

D. Certified Surveys: Submit two (2) copies signed by land surveyor.
E. Final Property Survey: Submit ten (10) copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. 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 local utility 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.


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. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. 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 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 **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. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.

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

F. 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.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

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.

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

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner’s construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner’s construction forces.
   1. Construction Schedule: Inform Owner of Contractor’s preferred construction schedule for Owner’s portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
   2. Preinstallation Conferences: Include Owner’s construction forces at preinstallation conferences covering portions of the Work that are to receive Owner’s work. Attend preinstallation conferences conducted by Owner’s construction forces if portions of the Work depend on Owner’s construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold materials more than 7 days during normal weather or 3 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

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.

3.8 STARTING AND ADJUSTING

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

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

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: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 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.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00
SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:
   1. Divisions 02 through 48 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
   2. Section 07 84 13 ‘Penetration Firestopping’ for patching fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least ten (10) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building’s appearance and other significant visual elements.
   3. Products: List products to be used and firms or entities that will perform the Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect’s Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. 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. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related 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.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. 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.

B. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

A. 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. 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 as small as possible, neatly to 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 Division 31 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.

C. 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 possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate 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 eliminate evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
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.
   a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
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.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

E. Insert specific installation requirements if not specified elsewhere. Specific installation requirements are better specified in individual Sections.

END OF SECTION 01 73 29
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. This Section includes administrative and procedural requirements for the following:
   1. Recycling nonhazardous construction waste.
   2. Disposing of nonhazardous construction waste.

B. Related Sections include the following:
   1. Section 01 50 00 "Temporary Facilities and Controls" for environmental-protection measures during construction, and location of waste containers at Project site.
   2. Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
   3. Section 31 10 00 "Site Clearing" disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site construction waste and deposit in landfill.

1.4 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work.
C. Waste Reduction Work Plan: List each type of waste and whether it will be recycled or disposed of in landfill. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 01 Section 'Temporary Facilities and Controls' for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with Division 01 Section 'Temporary Facilities and Controls' for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE

A. Packaging:
1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be recycled, remove waste materials from Project site and legally dispose of them in a landfill.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner’s property and legally dispose of them.

END OF SECTION 01 74 19
SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Section 01 73 00 "Execution" for progress cleaning of Project site.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.
5. Divisions 02 through 48 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer’s name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner’s personnel of changeover in security provisions.
8. Complete startup testing of systems.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner’s occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor’s list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section “Payment Procedures.”
2. Submit certified copy of Architect’s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three (3) copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

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

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide two copies of each warranty to include in operation and maintenance manuals.
PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

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

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

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

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner’s property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

B. Related Requirements:

1. Section 01 33 00 “Submittal Procedures” for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

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

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

1.4 CLOSEOUT SUBMITTALS

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

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

B. Format: Submit operations and maintenance manuals in the following format:
   
a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   
b. Enable inserted reviewer comments on draft submittals.
   
2. Two (2) paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two (2) copies.
   
C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
   
D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
   
1. Correct or revise each manual to comply with Architect’s comments. Submit copies of each corrected manual within 15 days of receipt of Architect’s comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

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

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

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

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

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to
2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

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

1. Title page.
2. Table of contents.

B. Title Page: Include the following information:

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

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

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

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

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required. (Submit three (3) CD’s to District.)

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names...
used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes. (Submit two (2) complete manuals to District).

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

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

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

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

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

2.3 EMERGENCY MANUALS

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

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

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
2. Flood.
5. Power failure.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

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

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

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

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

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

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

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

2.5 PRODUCT MAINTENANCE MANUALS

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

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

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

1. Product name and model number.
2. Manufacturer’s name.
3. Color, pattern, and texture.
5. Reordering information for specially manufactured products.

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

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

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

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers’ maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

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

C. Manufacturers’ Maintenance Documentation: Manufacturers’ maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

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

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

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

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

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

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

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

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

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

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

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers’ standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

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

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 “Project Record Documents.”

G. Comply with Section 01 77 00 “Closeout Procedures” for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

B. Related Sections:

1. Section 01 73 00 "Execution" for final property survey.
2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 02 through 48 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Initial Submittal: Submit one (1) paper copy set of marked-up record prints. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   b. Final Submittal: Submit one (1) paper copy set of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one (1) paper copy of Project's Specifications, including addenda and contract modifications.
C. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one (1) paper copy of each submittal.

D. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one (1) set of marked-up paper copies of the Contract Drawings and Shop Drawings.

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

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

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

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect’s written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

B. Format: Submit record Specifications as marked up paper copy of Specifications.

2.3 MISCELLANEOUS RECORD SUBMITTALS

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

B. Format: Submit miscellaneous record submittals as paper copy.
   1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

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

END OF SECTION 01 78 39
PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes administrative and procedural requirements for instructing Owner’s personnel, including the following:

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

B. Related Sections include the following:

1. Divisions 02 through 48 Sections for specific requirements for demonstration and training for products in those Sections.

C. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up.

1.3 SUBMITTALS
A. Instruction Program: Submit two (2) copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors’ names for each training module. Include learning objective and outline for each training module.

1. At completion of training, submit one (1) complete training manual for Owner’s use.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

D. Demonstration and Training Videotapes: Submit two (2) copies within seven (7) days of end of each training module.
1. Identification: On each copy, provide an applied label with the following information:
   a. Name of Project.
   b. Name and address of photographer.
   c. Name of Architect.
   d. Name of Contractor.
   e. Date videotape was recorded.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

2. Transcript: Prepared on 8-1/2-by-11-inch (215-by-280-mm) paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

1.4 QUALITY ASSURANCE

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

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors’ personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner’s operations. Adjust schedule as required to minimize disrupting Owner’s operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

1. Motorized doors, including overhead coiling doors.
2. Equipment, including stage equipment, projection screens, loading dock equipment, food-service equipment, and laboratory fume hoods.
3. Fire-protection systems, including fire alarm and fire-extinguishing systems.
4. Intrusion detection systems.
5. Conveying systems, including elevators.
6. Laboratory equipment, including laboratory air equipment and piping.
7. Heat generation, including boilers, pumps, and water distribution piping.
8. Refrigeration systems, including chillers, cooling towers, and distribution piping.
9. HVAC systems, including air-handling equipment and air distribution systems.
10. HVAC instrumentation and controls.
11. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
12. Packaged engine generators, including transfer switches.
13. Lighting equipment and controls.
14. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data and television equipment.

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

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:
a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project Record Documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

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

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

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning

e. Procedures for preventive maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs: Include the following:

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

PART 3 - EXECUTION

3.1 PREPARATION

   A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

   B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

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

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

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

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

      1. Schedule training with Owner, through Architect, with at least seven (7) days advance notice.
3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Videotape Format: Provide high-quality color video recordings in format acceptable to architect.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

END OF SECTION 01 79 00
DIVISION 03 – CONCRETE

03 30 00 CAST-IN-PLACE CONCRETE

03 39 50 SEALER/HARDENER CONCRETE FLOOR FINISH

03 54 00 CAST UNDERLAYMENT
SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slab.
5. Equipment pads and bases, etc.
6. Concrete cap.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 033950 “Sealer/Hardener Concrete Floor Finish” for sealing of concrete.
2. Section 071100 “Underslab Vapor Barrier”.
3. Section 079200 “Joint Sealants” for slabs-on-grade.
4. Section 099123 “Interior Painting” for paint type of exposed concrete.
5. Section 142400 “Hydraulic Elevators”.

5.1 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others if requested by Architect.

C. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures” showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete.
reinforcement. Include special reinforcing required for openings through concrete structures.

D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:

1. Normal weight aggregates.

E. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

5.2 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. ACI 318, "Building Code Requirements for Reinforced Concrete."

B. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor’s expense.

C. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" and the following:

1. At least 15 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:

   a. Contractor’s Superintendent.
   b. Agency responsible for concrete design mixes.
   c. Agency responsible for field quality control.
   d. Ready-mix concrete producer.
   e. Concrete Subcontractor.
PART 6 - PRODUCTS

6.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Cylindrical Columns and Supports: Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches (38 mm) to the plane of the exposed concrete surface.

1. Provide ties that, when removed, will leave cone shaped holes not larger than 1 inch (25 mm) in diameter in the concrete surface. (Where shown on plans)

6.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615 Grade 60 (ASTM A 615M Grade 400), deformed. Refer to Structural General Note Sheet.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.


D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
6.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

1. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 4, and as specified. Provide aggregates from a single source for exposed concrete.

2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
3. Combined aggregate gradation material passing No. 200 sieve, no more than 1.75%, washed aggregate.


D. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
   a. Air-Tite, Cormix Construction Chemicals.
   b. Air-Mix or Perma-Air, Euclid Chemical Co.
   c. Darex AEA or Daravair, W.R. Grace & Co.
   d. MB-VR or Micro-Air, BASF.
   e. Sealtight AEA, W.R. Meadows, Inc.
   f. Sika AER, Sika Corp.

F. Water-Reducing Admixture: ASTM C 494, Type A.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
   b. PSI N, Cormix Construction Chemicals.
   c. Eucon WR-75, Euclid Chemical Co.
   d. WRDA, W.R. Grace & Co.
   e. Pozzolith Normal or Polyheed, Master Builders, Inc.
   f. Metco W.R., Metalcrete Industries.
   g. Prokrete-N, Prokrete Industries.
h. Plastocrete 161, Sika Corp.

G. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. PSI-R Plus, Cormix Construction Chemicals.
   b. Eucon Retarder 75, Euclid Chemical Co.
   c. Daratard-17, W.R. Grace & Co.
   d. Pozzolith R, Master Builders, Inc.
   e. Protard, Prokrete Industries.
   f. Plastiment, Sika Corporation.

6.4 RELATED MATERIALS

A. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick (0.85 mm) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.

B. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.

C. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type 1, Class B.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
   b. Sealco – VOC, Cormix Construction Chemicals.
   c. Safe Cure and Seal, Dayton Superior Corp.
   d. Aqua-Cure, Euclid Chemical Company
   e. Dress & Seal WB, L&M Construction Chemicals, Inc.
   g. Metcure, Metalcrete Industries
   h. Stonetop CS1, Stonhard, Inc.
   i. ChemMasters Safe-Cure 1000 Clear.

D. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
a. Burke Epoxy M.V., The Burke Co.
b. Euco Epoxy System #452 or #620, Euclid Chemical Co.
c. Epoxite Binder 2390, A.C. Horn, Inc.
d. Concreseive Standard Liquid, Master Builders, Inc.
e. Rezi-Weld 1000, W.R. Meadows, Inc.
f. Metco Hi-Mod Epoxy, Metalcrete Industries.
g. Sikadur 32 Hi-Mod, Sika Corp.
h. Hilti Hit RE 500 SD, Hilti Corp.
i. Simpson Set-XP, Simpson-Strong Tie Co.
j. R-600 Series, Symons Corp.
k. Sika Armatec 110 EpoCem, Sika Corp.
l. Duraguard 100.

6.5 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings:

D. Water-Cement Ratio: As indicated on the structural drawings.

E. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as indicated:

F. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

6.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
C. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer’s prescribed rate to result in concrete at point of placement having total air content as indicated on the structural drawings.

PART 7 - EXECUTION

7.1 GENERAL

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

7.2 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A, 1/8 inch, tolerance for concrete surfaces exposed to view.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood or metal, fabricated to produce uniform smooth lines and tight edge joints.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

7.3 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute’s recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

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

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.

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

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

7.4 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.

B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."
E. **Contraction (Control) Joints in Slabs-on-Grade:** Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts as indicated on the structural drawings.

1. Form contraction joints by inserting pre-molded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

3. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

### 7.5 INSTALLING EMBEDDED ITEMS

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

B. Install dovetail anchor slots in concrete structures as indicated on drawings.

C. Install cone-ties in foundation walls as indicated on drawings.

D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

### 7.6 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

### 7.7 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. Maintain reinforcing in proper position on chairs during concrete placement.

F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

1. Do not use frozen ingredients or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 301 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to
below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

7.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch all defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

2. Concrete forms to have form liners in order to achieve a smooth formed finish.

3. It shall be the responsibility of the Concrete Subcontractor to provide architectural smooth walls void of honeycomb, air pockets, and all other defective finishes for areas exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

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

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surfaces with clean burlap and keep surface damp by fog spray for at least 36 hours.

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

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

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

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

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

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

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface.

   a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17; for slab-on-grade.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot (3.05 m) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:

   a. 1/8 inch (3.2 mm).

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

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

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

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer’s instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 5 days.

C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

D. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer’s directions. Recruit areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

E. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or
until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

F. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.12 REMOVING FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

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

3.13 REUSING FORMS

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

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.14 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh (1.2 mm) sieve, using only enough water as required for handling and placing.
1. Cut out honeycombs, rock pockets, voids over 1/2 inch (13 mm) in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch (25 mm). Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

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

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete’s durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete’s durability. Surface defects include crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch (25 mm) in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes 1 inch (25 mm) or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Owner will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
   a. Slump: ASTM C 143; one test at point of discharge for each day’s pour of each type of concrete; additional tests when concrete consistency seems to have changed.
   b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day’s pour of each type of air-entrained concrete.
   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
   d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
   e. Compressive-Strength Tests: ASTM C 39; one set for each day’s pour exceeding 5 cu. yd. (4 cu. m) plus additional sets for each 50 cu. yd. (38 cu. m) more than the first 25 cu. yd. (19 cu. m) of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

C. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Non-Destructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The testing agency will make additional tests of in-place concrete when test
results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 30 00
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. This Section includes the following:
      1. Applying Sealer/Hardener to concrete floors scheduled and burnishing to develop sheen.
      2. Joint Sealant.
   B. Related Sections include the following:
      1. Section 03 30 00 "Cast-in-Place Concrete".

1.3 REFERENCES
   B. ASTM C 1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic
      Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method; 1996.
   C. ASTM G23-81 - Standard Practice for Operating Light - Exposure Apparatus (Carbon-Arc Type)
      with and without Water Exposure of Nonmetallic Materials.

1.4 SUBMITTALS
   A. See Section 01 60 00 - Product Requirements.
      1. Provide submittal information within 10 calendar days after the contractor has received the
         Owner’s Notice to Proceed.
   B. Product Data: Submit manufacturer’s data sheets on each product to be used, including:
      1. Sealer/Hardener Concrete Finish schedule indicating locations and applications by
         manufacturer’s name and product number.
2. Product Data describing product to be provided, giving manufacturer’s name and product name for the specified material proposed to be provided under this Section.
3. Preparation instructions and recommendations.
4. Storage and handling requirements and recommendations.
5. Installation methods and procedures, which when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
6. Maintenance data to include detailed instructions on recommended cleaning apparatus and cleaning solutions.

C. Submittals: For each finish specified submit seven (7) complete sets of manufacturer’s latest published product data sheets, test data, maintenance data and material safety data sheets and other safety requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer’s Quality Assurance:

1. Submit manufacturer’s certified test reports, prepared by an independent testing laboratory, confirming that products comply with specified performance criteria and are suitable for intended application.

B. Applicator’s Quality Assurance: Submit list of a minimum of five (5) completed projects of similar size and complexity to this Work. Include for each product:

1. Project name and location.
2. Name of Owner.
3. Name of Contractor.
5. Name of Sealer/Hardener Concrete Finish applied.
6. Approximate area of Sealer/Hardener Concrete Finish applied.
7. Date of completion.
8. Applicator shall be Certified Applicator of specified Sealer/Hardener Concrete Floor Finish and familiar with the specified methods needed for proper performance of work of this Section.

C. Manufacturer’s Certification:

1. Provide a letter of certification from Sealer/Hardener manufacturer stating that the applicator is a Certified applicator of the manufacturer and is familiar with proper procedures and installation requirements required by the Manufacturer.

1.6 PRE-INSTALLATION MEETING

A. Convene a pre-application meeting before start of application of Sealer/Hardener Concrete Finish. Require attendance of parties directly affecting work of this Section, including Contractor, Architect, and Certified Applicator. Review the following:
1. Environmental requirements.
2. Surface preparation.
3. Application and Burnishing.
4. Repair.
5. Field quality control.
6. Cleaning.
7. Protection of adjacent surfaces.
8. Coordination with other work and personnel.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original, factory sealed, unopened, new containers bearing manufacturer’s name and label intact and legible, with the following information:

1. Name or title of material.
2. Manufacturer’s standard container drum numbers.
3. Application instructions.
4. Maintain record of container drum numbers.

B. Storage:

1. Store materials in protected and well ventilated area at temperature between 40° and 90° degrees F., unless otherwise required by manufacturer.
2. Keep containers sealed until ready for use.
3. Do not use materials beyond manufacturer’s shelf life limits.

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

D. Empty drums will be retained at jobsite until Manufacturer’s Representative verifies the proper amount of material has been used per the Manufacturer’s recommendations.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with Sealer/Hardener Manufacturer’s instructions.

B. Surface Temperature: Minimum of 5 degrees F above dew point.

C. Relative Humidity: Not above 85% and surface temperature is at least 5 degrees F above dew point.

D. Limitations: Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting Sealer/Hardener Concrete Floor Finish performance.

E. Close areas to traffic during floor application and after application for time period recommended by Sealer/Hardener Concrete Floor Finish Manufacturer.
1.9 **WARRANTY**

A. See Division 01 for additional warranty requirements.

B. Sealer/Hardener: Manufacturer’s and Certified Applicator’s Joint Agreement for twenty (20) year material warranty and five (5) year labor warranty.

**PART 2 - PRODUCTS**

2.1 **MANUFACTURERS**

A. Acceptable Manufacturer:

1. Penetrating Sealer/Hardener Concrete Floor Finish: Ashford Formula, manufactured by Curecrete Chemical Company; Springville, Utah.
   a. Contact: Brett Cline Surface Solutions (801) 330-5588.

2. L&M "Seal Hard".

3. Euclid "Diamond Head".

4. Other Sealer/Hardener Concrete Floor Finishes will be acceptable if they meet or exceed the performance test data and meet requirements of the specified Concrete Floor Finish for its intended use and function as specified herein.

B. Substitutions: See Section 016000 - Product Requirements.

2.2 **PENETRATING SEALER/HARDENER CONCRETE FLOOR FINISH**

A. Basis of Design: Ashford Formula. Formulated to permanently seal, dustproof, increase abrasion resistance and develop permanent densification to concrete surfaces to which it is applied.

B. Description: Clear liquid form of silicate to permanently seal, dustproof and harden concrete surfaces and provide abrasion resistance by penetrating into concrete pores and chemically reacting. Chemically relies on an internal reaction, leaving no surface film or residue to densify pores. Products containing silicanolates, silicones, magnesium or lithium silicates will not be acceptable and will not be approved.

C. Performance Criteria:

1. ASTM C 779, Abrasion: An improvement of 32.5% over untreated samples after 30 minutes.

2. ASTM D 3359, Surface Adhesion: A 22% increase in adhesion over untreated samples, when tested with epoxy.

3. ASTM C39 Compressive Strength. An increase of 40% over untreated samples after seven days.
4. ASTM C 805 Impact Resistant. An increase of 13.3% over untreated samples when tested by Schmidt Hammer.

5. Permeability: Sealed and treated surface allowed a rate of 0.00073 oz. (0.022cc) per hour when tested by a 7-foot (2.13 meter) head of water applied to 4.91 square inch (122224.71 mm) area.

6. ASTM C 1028 Friction: No less than 0.86 result of coefficient of friction on sealed and treated dry surfaces and no less than 0.69 result of coefficient of friction on sealed and treated wet surfaces.

7. ASTM G 23 Light Exposure. No adverse effects on sealed and treated samples.

8. TTM-59, Chemical Resistance: No effect when exposed to alcohols, amines, alkaline detergents, ethers, Halogenated hydrocarbons, hydrocarbons, hydraulic fluids, ketones, oils and fuels. Moderate chemical resistance to some inorganic and organic acids.

D. Manufacturer’s Technical Representative available to make site visits if requested by Architect.

E. Sealer/Hardener Concrete Finish Schedule:

1. Special Flooring, (SF-1): Ashford Formula applied at 200 SF per gallon.

2.3 JOINT SEALANT

A. Product:

1. “Crete Fill” by Curecrete of Springville, Utah, (800) 366-2254.
2. Versaflex SL 85 by Versaflex of Kansas City, Kansas (913) 321-1416.

B. Color: Custom color as selected by the Architect.

C. Polyurea Joint Sealant, (non-staining) must meet specification requirements for compatibility with Sealer/Hardener Concrete Finish as recommended by manufacturer of concrete Sealer/Hardener.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with certified applicator (installer) present, for conditions affecting performance of Sealer/Hardener Concrete Finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

B. Do not begin installation until substrates have been properly prepared and the floor surfaces are free of construction latents and foreign contaminants that will inhibit penetration of Sealer/Hardener and performance.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3.2 SURFACE PREPARATION OF CONCRETE FLOORS

A. General:

1. Remove curing, sealing and coating agents, oil, breaking compound residue, wax and grease by scraping off heavy deposits mechanically or chemically to assure penetration of product into surface. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
2. Remove dust and loose material by brushing, sweeping, vacuuming, and blowing with high pressure air.
3. Remove paint residue with solvent/stripper provided the stripper does not have an acidic pH.
4. Remove tire marks or any residue with compatible non-acidic degreaser or stripper as recommended by manufacturer. Mix proper dilution so that the chemical does not etch and open the pores of the concrete. Follow manufacturer’s detailed instruction prior to mixing and removal.
5. Power rinse entire floor surface to thoroughly rinse and remove all soap residue or contaminants. Squeegee dry.

B. Grind protrusions flush with surface. Patch voids, holes and cracks with recommended cementicious patching material compatible with Sealer/Hardener Concrete Floor Finish.

C. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and all other contaminants.

D. Protect surrounding and adjacent surfaces in manner recommended by Sealer/Hardener Concrete Finish Manufacturer.

3.3 APPLICATION

A. General:

1. Apply Sealer/Hardener Concrete Finish in strict accordance with Manufacturer’s latest printed instructions. Utilize manufacturer’s recommended equipment for installation. Use low pressure drum pump with high volume sprayer or pour from drums or pails to flood surface during first coat application. Pump up sprayer may be used for applying spiff coat following manufacturer’s recommended procedures.
2. Application is to take place prior to any in-store accessory installation or as scheduled and coordinated by the Architect thus allowing as complete and uninhibited concrete slab area for installation.
3. Only Manufacturer’s Certified Applicator may apply Sealer/Hardener Concrete Finish. Applicable procedures must be followed as recommended by the Manufacturer.
4. Manufacturer’s Certified Applicator to install specified Sealer/Hardener Concrete finish in strict accordance with manufacturer’s recommended procedures for each application as specified herein.
5. Comply with recommendations of product manufacturer for drying time between succeeding coats.
6. Recoat sealed floors where there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat free of other defects due to insufficient sealing or sheen. Apply additional Ashford Formula if required by Sealer/Hardener Concrete Finish Manufacturer or Architect.

7. Remove defective floor areas visible and unacceptable to Sealer/Hardener Manufacturer or Architect in accordance with Sealer/Hardener Concrete Finish as specified herein.

8. Make edges of Sealer/Hardener Concrete Finish adjoining other materials clean and sharp.


10. After spiff coat has been applied, burnish with high speed propane burnisher capable of a minimum of 2700 rpm equipped with a black stripping pad, followed by a purple pad and a blue burnishing pad or a hogs hair pad to develop sheen.

3.4 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: Manufacturer’s representative must be available to provide technical assistance and guidance for surface preparation and application of Sealer/Hardener Concrete Finish.

B. Sealer/Hardener Concrete Finish shall be inspected and acceptable to the Architect and the manufacturer of Sealer/Hardener Concrete Finish. Any area that is found unacceptable shall be repaired by the Certified Applicator as deemed necessary.

3.5 WORKMANSHIP AND CLEANING

A. The premises shall be kept clean and free of debris at all times.

B. Touch-up and restore finish where damaged.

C. Remove spilled, splashed or splattered finish material from all surfaces, as required.

D. Do not mar surface finish or item being cleaned. Make necessary repairs to damaged surfaces caused by cleaning operation or installation of Sealer/Hardener Concrete Finish.

E. Remove debris from jobsite. Dispose of materials in separate, closed, sealed containers in accordance with local regulations.

3.6 PROTECTION

A. Protect and prohibit traffic on Sealer/Hardener Concrete finished work according to manufacturer’s instructions and recommendations.

B. Barricade areas to protect Ashford Formula spiff coat until properly cured for traffic according to manufacturer’s instructions and recommendations.
C. Refer to manufacturer for materials used to cover and protect the flooring surfaces. Do not apply any tape to the floor as it will etch concrete surfaces.

3.7 SCHEDULES

A. Sealer/Hardener: Ashford Formula; penetrating Sealer/Hardener Concrete Finish, to be placed on interior exposed concrete floor surfaces in locations as detailed on drawings.

END OF SECTION 03 39 50
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Liquid-applied self-leveling floor underlayment of any of the following types conforming to minimum psi requirements indicated.
   2. Cement based self-leveling floor underlayment.
   3. Combination of gypsum and cement based self-leveling floor underlayment.
B. Sealer for areas to receive adhered floor finishes.

1.2 REFERENCE STANDARDS


1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer’s data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on mixing instructions.
C. Acoustical Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC).
   1. Submit in writing that all sound tests or data provided has been tested according to UL (Underwriters Laboratory) fire resistance design number.
D. Manufacturer’s Instructions: Indicate mix instructions.
E. Sealer: Submit product data demonstrating compatibility with underlayment and finish floor material.
F. Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section and approved by manufacturer.
1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for combustibility or flame spread requirements.

B. Conform to applicable code requirements for acoustic requirements.
   1. Air-borne sound. Walls, partitions, and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 for air-borne noise when tested in accordance with ASTM E90.

   2. Structure-borne sound. Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 50 when tested in accordance with ASTM E492.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.

1.6 FIELD CONDITIONS

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

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

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Cast Underlayment:
   1. Design Basis: Maxxon Corporation; Product Dura-Cap.

B. Subject to compliance with requirements, other manufacturers providing comparable products that may be incorporated into the Work include, but are not limited to, the following:
2.2 MATERIALS

A. Gypsum-Based Underlayment: Gypsum based mix, that may contain cement, when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 3500 psi, tested per ASTM C472, with no modifications.
   2. Density: Minimum 120 lb/cu ft.
   3. Final Set Time: 1 to 2 hours, maximum.
   4. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
   5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

B. When Required; Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.

C. When Required; Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.

D. Water: Potable and not detrimental to underlayment mix materials.

2.3 MIXING

A. Site mix materials in accordance with manufacturer’s instructions.

B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.

C. Proportionally mix to achieve the density and compressive strength values listed above.

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

2.4 ACCESSORIES

A. Tape: Neoprene or rigid foam sealing tape at sill plate of wood stud demising walls to stop moisture migration from cast underlayment to wood framing members and to reduce sound transmission through the underlayment to the wall framing.

B. Primer: Manufacturer’s recommended type.

C. Surface Enhancer, as recommended by manufacturer.

D. Primer/Sealer, as recommended by manufacturer.
   1. Material Standard: Comply with specifications outlined in manufacturer’s applicator manual, and acceptable/compatible with finish floor adhesive.

E. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

F. Mix Water: Potable and not detrimental to underlayment mix materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum bi-products, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

A. Wood: Install metal lath for reinforcement of underlayment.

B. Wood substrate:
   1. Limit design of subfloor and framing to a minimum L/360.
   2. Wood should be APA rated T&G or back blocked at joints.


D. Vacuum clean surfaces.

E. Prime substrate in accordance with manufacturer’s instructions. Allow to dry.

F. Close floor openings.

3.3 APPLICATION

A. Install underlayment in accordance with manufacturer’s instructions.

B. Priming subfloor:
   1. Prime substrate according to manufacturer’s recommendations. Instructions and the number of coats will vary depending on application.
C. Pump or pour material onto substrate. Do not retemper or add water.
   1. Pump, move, and screed while the material is still highly flowable.
   2. Be careful not to create cold joints.
   3. Wear spiked shoes while working in the wet material to avoid leaving marks.

E. Place to 1-1/2” thickness, with top surface level to an application tolerance of 1/16 inch in 10 ft.

F. Place after partition installation.

G. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.4 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer’s instructions.

3.5 FIELD QUALITY CONTROL

A. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00.

B. Placed Material: Agency will inspect and test for conformance to specification requirements.
   1. Prepare three (3) compression test cubes for each placement of 1,000 square feet or less.

3.6 PROTECTION

A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.

B. Do not permit traffic over unprotected floor underlayment surfaces.

C. Protect all adjacent construction from moisture during curing of product.

3.7 SEALER

A. Sealing: Seal all areas that receive glue down floor goods, including but not limited to; bathrooms, toilet rooms, laundry areas, and all areas within 10 feet of all other sinks with manufacturer’s approved sealer and according to the manufacturer’s specifications.
1. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering or location.

2. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.

B. Floor Goods Procedures: Refer to the manufacturer’s “Procedures for Attaching Finished Floor Goods to Underlayments” brochure for guidelines for installing finished floor goods.

1. Follow manufacturer’s recommendations regarding moisture levels and vapor retarders before proceeding with installation of finish floor system

3.8 SCHEDULE

A. Gypsum-Based Underlayment: All floors above grade unless noted otherwise.

END OF SECTION 03 54 00
DIVISION 04 – MASONRY

04 01 10 MASONRY CLEANING
04 20 00 UNIT MASONRY
PART 1 - GENERAL

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

1.1 SUMMARY
   A. Section includes cleaning of unit masonry and brick repair as follows:
      1. Repairing unit masonry, including replacing units.
      2. Repointing joints.
      3. Cleaning exposed unit masonry surfaces.
   B. Related Sections:
      1. “Unit Masonry” refer to Structural Construction Documents.

1.2 DEFINITIONS
   A. High-Pressure Spray: 800 to 1200 psi, 3 to 5 gpm.

1.3 SUBMITTALS
   A. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
   B. Submit manufacturer’s product data sheets, MSDS pages including manufacturer’s printed instructions for evaluating conditions and procedures for cleaning of existing masonry surfaces.

1.4 QUALITY ASSURANCE
   1. Obtain materials from a single manufacturer which has been engaged in manufacturing masonry cleaning products for a minimum of five years.
   2. Contractor shall have a minimum of five years experience in performing masonry restoration cleaning.
   3. Apply product to test cleaning mock-up panels to determine the effectiveness of the cleaning products and procedures as well as desired results. Do not begin full scale application until test panels are inspected and approved. Maintain test panels for the duration of the cleaning work.
4. Retain and protect approved test panel/s for the duration of the restoration cleaning work, as a standard for judging the cleaning process.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Check masonry unit manufacturer’s recommendations for cleaning each type of masonry used on project.

B. For daily clean-up of masonry.
   1. Clean masonry every 7-14 days (maximum). Only use proprietary cleaner as specified by manufacturer of masonry.

C. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
   1. EaCo Chem, Inc NMD 80 (new masonry detergent) or SOS 50 (new masonry detergent).
   2. Sure Klean No. 101 Lime Solvent; Prosoco, Inc.

D. For dark-colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.
   1. EaCo Chem, Inc NMD 80 (new masonry detergent) or SOS 50 (new masonry detergent).
   2. Sure Klean No. 600 Detergent; Prosoco, Inc.

E. For light colored masonry (white, gray, tan, etc.).
   1. EaCo Chem, Inc NMD 80 (new masonry detergent) or SOS 50 (new masonry detergent).
   2. Sure Klean Vana Trol; Prosoco, Inc.

F. For concrete masonry units.
   1. EaCo Chem, Inc NMD 80 (new masonry detergent) or SOS 50 (new masonry detergent).
   2. Sure Klean Vana Trol; Prosoco, Inc.
   3. Sure Klean Custom Masonry Cleaner; Prosoco, Inc.
   4. Sure Klean 600 Detergent; Prosoco, Inc.

G. For honed block (interior).
   1. EaCo Chem, Inc NMD 80 (new masonry detergent) or SOS 50 (new masonry detergent).
   2. Sure Klean Burnished Custom Masonry Cleaner.

H. DO NOT USE MURIATIC ACID AS CLEANING METHOD.
PART 3 - EXECUTION

3.1 PROTECTION

A. Comply with chemical-cleaner manufacturer’s written instructions for protecting other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces.
2. Keep wall wet below area being cleaned to prevent streaking from runoff.

3.2 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.

D. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

E. Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

F. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

G. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.). Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.

3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.3 MASONRY UNIT PATCHING

A. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch (6 mm) thick, but not less than recommended by patching compound manufacturer.

2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.

3. Mix patching compound in individual batches to match each unit being patched.

4. Rinse surface to be patched and leave damp, but without standing water.

5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer’s written instructions.

6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 mm) thick. Roughen surface of each layer to provide a key for next layer.

7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.

8. Keep each layer damp for 72 hours or until patching compound has set.

3.4 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner; work from top to bottom or bottom to top according to cleaner manufacturer instructions.

B. Use only those cleaning methods indicated for each masonry material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.

2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.

   a. Do not apply with high-pressure washing equipment.

3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
4. For heated water-spray application, use equipment capable of maintaining temperature between 150 and 180 deg F (66 and 82 deg C) at flow rates of 3 to 5 gpm.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical-cleaner manufacturer’s written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer. Do not allow the cleaning solution to dry on the brick.

1. Follow manufacturer’s recommended dilution ratio.

E. Rinse off chemical residue and soil by working from top to bottom or upward from bottom to top of each treated area at each stage or scaffold setting as recommended by chemical cleaner manufacturer. Insure that all chemicals and residue are completely removed from substrate.

3.5 CLEANING MASONRY

A. Mild Acidic Chemical Cleaning:

1. Use products as recommended by the manufacturer and further defined by project testing. If conditions vary from project testing conditions, notify architect and do not proceed with work until instructed by the architect.

2. Be aware when cleaning masonry surfaces and the conditions are outside the manufacturer’s requirements which include:

   a. Temperatures below freezing or will be overnight. Allow adequate time for masonry to thaw if freezing conditions exist before application. Best cleaning results are when air and surface temperatures are 40ºF or above.

   b. Temperatures exceeding 90ºF, flash cool the surface by pre-wetting not soaking with water before applying product.

   c. Do not allow product to dry on the surface always rinse while wet.

3. Wet masonry with cold water applied by low-pressure spray.

4. Apply cleaner to masonry by brush or low-pressure spray as recommended by chemical cleaner manufacturer. Let cleaner remain on surface for period indicated below:

   a. As recommended by chemical-cleaner manufacturer.

   b. As established by mockup.

5. Rinse with cold or hot water as recommended by chemical cleaner manufacturer applied by high-pressure spray (800 to 1200 psi) to remove chemicals and soil.

6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
3.6 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:
   1. All joints in areas indicated.

B. Do not rake out and repoint joints where not required.
   1. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   2. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
      a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders.
      b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet.

C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

D. Pointing with Mortar:
   1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
   2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
   3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch (9 mm). Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
      a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
   6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
E. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.7 FINAL CLEANING

A. Clean site of all unused chemical cleaning products, residues, rinse water, wastes and cleaning effluents in accordance with environmental regulations.

B. Remove and dispose of all materials used to protect surrounding areas and non-masonry surfaces following completion of the work of this section.

END OF SECTION 04 01 10
1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. This Section includes the following:
      1. Concrete Masonry Units (CMUs).

   B. Related Sections: The following Sections contain requirements that relate to this Section:
      1. Section 04 01 10 'Masonry Cleaning' for cleaning of unit masonry surfaces.
      3. Section 07 19 00 'Water Repellents' for water repellents applied to unit masonry assemblies.

1.3 PERFORMANCE REQUIREMENTS
   A. Provide unit masonry that develops the following installed compressive strengths (f’m) at 28 days.
      1. For Concrete Masonry Unit: As indicated on drawings.

1.4 SUBMITTALS
   A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

   B. Product data for each different masonry unit, accessory, and other manufactured product specified.

   C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 “Details and Detailing of Concrete Reinforcement” showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

   D. Samples for initial selection of the following:
1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.

2. Colored-masonry mortar samples showing the full range of colors available.

E. Samples for verification of the following:

1. Colored-masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on the Project. Label samples to indicate type and amount of colorant used.

F. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to specifically identify exact materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor acceptance of mockup constitutes approval of deviations from Contract Documents unless such deviations are specifically brought to the attention of the Architect and approved in writing.

G. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcement.
4. Each type and size of anchors, ties, and metal accessories.

H. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

B. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Preinstallation Conference: Conduct conference at Project site.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

E. All pallets shall be shipped with a tag noting the date of manufacture. No units shall be installed that are less than 28 days old.

1.7 PROJECT CONDITIONS

Protection of Masonry: During construction, cover tops of walls with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress

1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed. Immediately remove grout, mortar, and soil that come in contact with such masonry. No salt or de-icing material is allowed around masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

   a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
   b. 32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry.
   c. 25 to 20 deg F (-4 to -7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F
(4 deg C) if grouting. Use heat on both sides of walls under construction.

d. 20 deg F (-7 deg C) and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within the enclosures.

2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

   a. 40 to 25 deg F (4 to -4 deg C): Cover masonry with a weather-resistant membrane for 48 hours after construction.
   b. 25 to 20 deg F (-4 to -7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h (25 km/h).
   c. 20 deg F (-7 deg C) and Below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 48 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

PART 2 - PRODUCTS

1.2 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide the following:

1. Concrete Masonry Units: Approved manufacturer’s:
   a. Lehi Block.
   b. Buehner Block.
   c. Amcor Block.

2. Hollow Brick:
   a) 8” x 8” x 16” – Split Face Block
   b) 8” x 8” x 16” – Ground Face Block
B. Products: Subject to compliance with requirements, provide one of the following:

1. Portland Cement, Mortar Cement, Portland Cement-Lime Mix:
   a. Holcim (US) Inc.
   b. Lafarge Corporation.
   c. Lehigh Custom Color Masonry Cement; Lehigh Portland Cement Co.
   d. Capital Materials Corp.

2. Mortar Pigments:
   b. Solomon Grind-Chem Services, Inc.

3. Cold-Weather Admixture:
   a. Euclid Chemical Co.
   b. W.R. Grace & Co.
   c. Sonneborn, Div. of Chemrex.

4. Joint Reinforcement, Ties, and Anchors:
   a. Dur-O-Wal, Inc.
   b. Heckman Building Products, Inc.
   c. Hohmann & Barnard, Inc.

2.3 CONCRETE MASONRY UNITS

A. Concrete Masonry Units: ASTM C 90, Grade N-1 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:
   a. 2500 psi.
   b. Min. block and grout strength required = 3500 psi.
   c. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Lightweight.
3. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.
4. Provide Type I, moisture-controlled units.
5. Size: Manufactured to the actual dimensions indicated on Drawings within tolerances specified in the applicable referenced ASTM specification.
6. Exposed Faces: Manufacturer’s standard color and texture, unless otherwise indicated, must be approved by Architect prior to delivery to 40BS.
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 Type S.


1. For colored-aggregate mortars, use mortar cement of natural color or white as required to produce mortar color indicated.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

1. For pigmented mortars, use colored portland cement-lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer’s standard formulations. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.

D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.

1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone, as required to match Architect’s sample.

E. Aggregate for Grout: ASTM C 404.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

G. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.

H. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.5 REINFORCING STEEL

A. Steel Reinforcing Bars: Material and grade as follows:
1. Billet steel complying with ASTM A 615 (ASTM A 615M).
   b. Grade 60 (Grade 400).
   c. Refer to “General Structural Notes” Sheet.


2.6 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie, and anchor for size and other characteristics:

B. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 123, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

C. Zinc-Coated (Galvanized) Steel Sheet: Carbon steel with zinc coating complying with ASTM A 525, Coating Designation G90.

D. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
   a. Wire Size for Side Rods: 0.1875" diameter.
   b. Wire Size for Cross Rods: 0.1875" diameter.
   c. Ladder Design with Perpendicular Cross Rods spaced not more than 16" o.c.

E. Unit Type Masonry Inserts in Concrete: Furnish cast iron or malleable iron inserts of type and size indicated.

F. Anchor Bolts: Provide steel bolts with hex nuts and flat washers complying with ASTM A 307, Grade A, hot-dip galvanized to comply with ASTM C 153, Class C, in sizes and configurations indicated.

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated.

B. Wire: As follows:

2. Wire Diameter: 0.25 inch (6.4 mm).
C. Steel Plates and Bars: ASTM A 36 (ASTM A 36M), hot-dip galvanized to comply with ASTM A 153, Class B-1, B-2, or B-3, as applicable to size and form indicated.

2.8 BENT WIRE TIES

A. Individual units prefabricated from bent wire to comply with requirements indicated below:

1. Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with closed ends and not less than 4 inches (100 mm) wide.
2. Type for Masonry Where Coursing Between Wythes Aligns: Unit ties bent from one piece of wire.
3. Type for Masonry Where Coursing Between Wythes Does Not Align: Adjustable ties composed of 2 parts; one with pintles, the other with eyes; maximum misalignment of 1-1/4 inches (32 mm).

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:

1. Neoprene.
2. Urethane.

B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.


2.13 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. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification, for types of mortar indicated below:

1. Limit cementitious materials in mortar to portland cement and lime.
2. For reinforced masonry use type indicated below:
a. Type: S.

3. Pre-mixed, factory packaged, factory blended to design specification and delivered to job site in packages labeled with mortar design, is preferred over job-mixed mortar.

4. Job mixed mortar is allowed with a design mix approved by Structural Engineer. All specifications concerning job site storage of materials shall be adhered to.

C. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
   1. Limit pigments to the following percentages of cement content by weight:
      a. For mineral oxide pigments and portland cement-lime mortar, not more than 10 percent.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.
   1. Mix to match Architect’s sample.

E. Grout for Unit Masonry: Comply with ASTM C476. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.
   1. Use fine grout in grout spaces less than 2 inches (50 mm) in horizontal dimension, unless otherwise indicated.
   2. Use coarse grout in grout spaces 2 inches (50 mm) or more in least horizontal dimension, unless otherwise indicated.
   3. Maximum aggregate size = 3/8”.
   4. 28 day strength = 3,000 psi minimum.
   5. 658 pounds cement per cuyd, 7 sacks.
   6. Minimum slump = 8”, maximum slump = 10”.
   7. Admixture added to increase flowability required.
   8. Grout prisms required.
   9. Grout mix design is required and shall be approved by Structural Engineer.

F. Clean grout stains immediately.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
C. All structural masonry construction shall be closely monitored by Structural Engineer to confirm construction is proceeding according to design requirements.

D. All grouting is to be observed by Special Inspector for conformance to design requirements, as indicated on drawings.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.

C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, un-chipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

F. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arises, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), nor 3/8 inch in 20 feet (10 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For top surface of bearing walls, do not exceed 1/8 inch (3 mm) in 10 feet (3 m), nor 1/16 inch (1.5 mm) within width of a single unit.
C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet (12 mm in 6 m), nor 3/4 inch in 40 feet (19 mm in 12 m) or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch (6 mm) nor plus 1/2 inch (12 mm).

E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch (3 mm). Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from collar-joint thickness indicated by more than minus 1/4 inch (6 mm) or plus 3/8 inch (10 mm).

3.4 LAYING MASONRY WALLS

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

B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

1. One-half running bond with vertical joint in each course centered on units in courses above and below.
2. As indicated on Drawings.

C. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch (10-mm) or 1/2-inch (13 mm) joints.

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

3.10 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry per industry standard where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

3.11 PROTECTION

A. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04 20 00
DIVISION 05 - METALS

05 50 00   METAL FABRICATIONS
05 51 13   METAL PAN STAIRS
05 52 13   PIPE AND TUBE RAILINGS
SECTION 05 50 00 - METAL FABRICATIONS

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. This Section includes the following:

1. Miscellaneous steel framing and supports.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Elevator machine beams, hoist beams, and divider beams.
4. Support angles for elevator door sills.
5. Shelf angles.
7. Steel weld plates and angles for casting into concrete not specified in other Sections.
8. Metal ladders.
9. Metal bollards.
10. Pipe guards.
11. Loose steel lintels.
12. Formed metal fabrication.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete.

C. Related Sections include the following:

1. Section 03 30 00 “Cast-in-Place Concrete” for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
2. Section 05 52 13 “Pipe and Tube Railings”.
3. Section 06 10 00 “Rough Carpentry” for metal framing anchors.
4. Section 14 24 00 “Hydraulic Elevators” for elevator pit ladders and support angles for elevator doors.
1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Prefabricated building columns.
3. Metal nosings and treads.
4. Paint products.
5. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

D. Welding certificates.

E. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. 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.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 METALS, GENERAL

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.

2.3 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

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

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
   1. Finish as indicated by Architect.

F. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts.

D. Anchor Bolts: ASTM F 1554, Grade 36.
   1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

G. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

H. Wood Screws: Flat head, ASME B18.6.1.


K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; 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, hot-dip galvanized per ASTM A 153/A 153M.

L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.


2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 "Painting" Sections.

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


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

F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.


H. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. 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 so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

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

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
   1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.7 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 retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Furnish inserts if units are installed after concrete is placed.
C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Galvanize miscellaneous framing and supports where indicated.

2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches (200 mm), unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.9 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.

1. Provide mitered and welded units at corners.

2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.

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

C. Galvanize shelf angles located in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.10 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.
2.11 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 not less than two integrally welded steel strap anchors for embedding in concrete.

2.12 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.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

2.13 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, unless otherwise indicated.
2. Space siderails 18 inches (457 mm) apart, unless otherwise indicated.
3. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted brackets, made from same metal as ladder.

B. Steel Ladders:

1. Siderails: Continuous, 1/2-by-2-1/2-inch (12.7-by-64-mm) steel flat bars, with eased edges.
2. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
4. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung by a proprietary process.
6. Products:

   a. IKG Industries, a Harsco company; Mebac.
   b. W. S. Molnar Company; SlipNOT.
   c. Precision Ladders, LLC.
   d. Approved by Architect prior to bidding.
7. Galvanize exterior ladders, including brackets and fasteners.

2.14 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.
   1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.

B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all 4 corners for 3/4-inch (19-mm) anchor bolts.
   1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.

2.15 PIPE GUARDS

A. Fabricate pipe guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.

B. Galvanize pipe guards after fabrication.

2.16 FORMED METAL FABRICATIONS

A. Protective screens are required in Gymnasium to protect surface mounted items (i.e. lights, clocks, detectors, thermostats, sprinkler heads, etc.)

2.17 FINISHES, GENERAL

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.18 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

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. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

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

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers’ written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in 'Installing Bearing and Leveling Plates' Article.

3.3 INSTALLING BEARING AND LEVELING PLATES


B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

   1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING METAL BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer’s written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

B. Fill bollards solidly with concrete, mounding top surface to shed water.

   1. Do not fill removable bollards with concrete.

3.5 INSTALLING PIPE GUARDS

A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each pipe guard. Mount pipe guards with top edge 26 inches (660 mm) above driving surface.
3.6 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.

   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

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

END OF SECTION 05 50 00
SECTION 05 51 13 - METAL PAN STAIRS

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. This Section includes the following:
   1. Preassembled steel stairs with concrete-filled treads.
   2. Steel tube railings attached to metal stairs.
   3. Steel tube handrails attached to walls adjacent to metal stairs.
   4. Glass clamps for attaching glass to railing.

B. Related Sections include the following:
   1. Section 03 30 00 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
   2. Section 05 52 13 "Pipe and Tube Railings" for pipe and tube railings.
   3. Section 05 52 13 "Pipe and Tube Railings" for pipe and tube railings not attached to metal stairs or to walls adjacent to metal stairs.
   4. Section 09 91 23 "Interior Painting" for finishing of railings and handrails where stainless steel is not indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of loads as specified in current I.B.C.

B. Structural Performance of Railings: Provide railings capable of withstanding the effects of loads as specified in current I.B.C.

C. Seismic Performance: Provide metal stairs capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.4 SUBMITTALS

A. Product Data: For metal stairs.
B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Provide templates for anchors and bolts specified for installation under other Sections.
2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For products involving selection of color.

D. Welding certificates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.
2. Industrial-Type Stairs: Industrial class.

C. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 COORDINATION

A. Coordinate installation of anchorages for metal stairs. 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.

B. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

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

B. Steel Tubing: ASTM A 500 (cold formed).

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. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).

E. Iron Castings: Either gray or malleable iron, unless otherwise indicated.
   1. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
   2. Malleable Iron: ASTM A 47/A 47M.

F. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.


E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).


H. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 ‘Interior Painting’ Section.


D. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete Materials and Properties: Comply with requirements in Division 03 Section ‘Cast-in-Place Concrete’ for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding, unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

F. Weld connections 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. Weld exposed corners and seams continuously, unless otherwise indicated.
5. 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.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.6 STEEL RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads as indicated on drawings.

1. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails, 1-1/2-inch- (38-mm-) square posts, and 1/2-inch- (13-mm-) square pickets spaced less than 4 inches (100 mm) clear.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

C. Form changes in direction of railings as follows:

1. As detailed.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. Connect posts to stair framing by direct welding, unless otherwise indicated.
2. For non-galvanized railings, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
2.7 STAIR RAILINGS
   A. Comply with applicable requirements in Division 05 Section “Pipe and Tube Railings”.

2.8 GLASS CLAMPS
   A. Glass Clamp: Provide flat base glass clamp for use on 1/2” thick tempered glass on stair railings.
      1. Finish: Brushed stainless.
      2. Size: Approx. 2-1/8” W x 2-5/16” H.
      3. Provide glass clamps as indicated on drawings.

2.9 FINISHES
   A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
   B. Finish metal stairs after assembly.
   C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
      1. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, “Power Tool Cleaning.”
   D. Apply shop primer to uncoated surfaces of metal stair components, and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, “Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel,” for shop painting.
      1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
   A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
   B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
   C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. 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.

F. 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.

G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section “Cast-in-Place Concrete.”

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES


B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   1. Use nonmetallic, non-shrink grout, unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING STEEL TUBE RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
   1. Anchor posts to steel by welding directly to steel supporting members.
   2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as indicated on drawings.
3.4 INSTALLING GLASS CLAMPS

A. Install glass clamps as recommended by manufacturer for proper adherence of glass.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 "Interior Painting" Section.

B. Finishing: Finishing of railings and handrails (where stainless steel is not indicated) are specified in Division 09 "Interior Painting" Section.

END OF SECTION 05 51 13
SECTION 05 52 13 - PIPE AND TUBE RAILINGS

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. This Section includes the following:
   1. Steel pipe and tube railings.
   2. Stainless-steel pipe and tube railings.

B. Related Sections include the following:
   1. Section 05 51 13 "Metal Pan Stairs" for handrail and railings attached to stairs.
   2. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring railings.
   3. Section 09 21 16 "Gypsum Board Assemblies" for metal backing for anchoring railings.
   4. Section 09 91 13 "Exterior Painting" for painting of handrail and railings not indicated as stainless steel.
   5. Section 09 91 23 "Interior Painting" for painting of handrail and railings not indicated as stainless steel.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
   1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Provide railings capable of withstanding the effects of loads as specified in the current I.B.C.

C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Manufacturer’s product lines of mechanically connected railings.
   2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Samples for Verification: For each type of exposed finish required.
   1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
   2. Fittings and brackets.
   3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
      a. Show method of connecting and finishing members at intersections.

E. Welding certificates.

F. Qualification Data: For professional engineer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."
   2. AWSD1.6, "Structural Welding Code--Stainless Steel."
1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. 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.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steel Pipe and Tube Railings:
   a. Pisor Industries, Inc.
   b. Sharpe Products.
   c. Wagner, R & B, Inc.; a division of the Wagner Companies.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed).

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
   1. Provide galvanized finish for exterior installations and where indicated.

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

D. Castings: Either gray or malleable iron, unless otherwise indicated.
   1. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
   2. Malleable Iron: ASTM A 47/A 47M.

2.4 STAINLESS STEEL

A. General: Provide Stainless Steel Handrails as follows:
   1. Tubing: ASTM A 554, Grade 304, made in U.S.A.
   2. Size: 1-1/2” O.D.
   4. Weld and grind smooth. Provide all termination to walls and railings, as required.

2.5 FASTENERS

A. General: Provide the following:

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
   2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Anchors: Provide torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed
when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 "Painting Sections".

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

D. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.


F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.


H. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: Where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads. See latest IBC.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners.

F. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

H. Connections: Fabricate railings with welded connections, unless otherwise indicated.

I. Remove sharp or rough areas on exposed traffic surfaces.

J. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   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 flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

K. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth rigid, hairline joints.
   1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer’s standard splicing method.

L. Form changes in direction as follows:
   1. As detailed.

M. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

N. Close exposed ends of railing members with prefabricated end fittings.

O. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with steel plate forming bottom closure.

Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.8 FINISHES, GENERAL

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STEEL AND IRON FINISHES

A. Galvanized Railings:


B. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
D. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

F. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:

1. Exterior Railings (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interior Railings (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."

G. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer needs to be applied to surfaces embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.
2. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 “Fabrication” Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with anchoring cement, mixed and placed to comply with anchoring material manufacturer’s written instructions.

B. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with anchoring cement, mixed and placed to comply with anchoring material manufacturer’s written instructions.

C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material or attached to post with set screws.

D. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) buildup, sloped away from post.

E. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.
### 3.5 ANCHORING RAILING ENDS

A. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

### 3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. Use type of bracket with predrilled hole for exposed bolt anchorage.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed gypsum board partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed gypsum board partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

### 3.7 ADJUSTING AND CLEANING

A. Clean Stainless Steel by washing thoroughly with clean water and soap and rinsing with clean water.

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

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13
### DIVISION 06 – WOOD, PLASTIC AND COMPOSITES

- 06 10 00  ROUGH CARPENTRY
- 06 16 00  SHEATHING
- 06 82 05  FIBERGLASS REINFORCED PLASTIC PANELING
SECTION 06 10 00 - ROUGH CARPENTRY

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. This Section includes the following:
   1. Framing with dimension lumber.
   2. Rooftop equipment bases and support curbs.
   3. Wood blocking, cants, and nailers.
   4. Plywood backing panels.

B. Related Sections include the following:
   1. Section 09 22 16 “Non-Structural Metal Framing” for solid blocking of all surface mounted items.

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   2. NLGA: National Lumber Grades Authority.
   3. RIS: Redwood Inspection Service.
   5. WCLIB: West Coast Lumber Inspection Bureau.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
5. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species.

C. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB, or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

D. For exposed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
2. Mixed southern pine, No. 2 grade; SPIB.
3. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
4. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Bolts: 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide blocking indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
SECTION 06 16 00 - SHEATHING

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. Section Includes:
   1. Wall sheathing.
   2. Roof sheathing.
   3. Parapet sheathing.
   5. Subflooring.
   6. Underlayment.
   7. Sheathing joint and penetration treatment.

B. Related Requirements:
   1. Section 06 10 00 ‘Rough Carpentry for plywood backing panels.
   2. Section 07 25 00 ‘Weather Barriers‘ for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
   3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
   4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by designations from UL's 'Fire Resistance Directory' or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health’s “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 WALL SHEATHING

A. Plywood Sheathing or Oriented-Strand-Board Sheathing: as indicated on structural drawings.
B. Paper-Surfaced Gypsum Sheathing: ASTM C 1396/C 1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core’s face, back, and long edges.
   1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
   2. Edge and End Configuration: Square.
   3. Size: 48 by 96 inches (1219 by 2438 mm) or 48 by 108 inches (1219 by 2743 mm).

C. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
   1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
   2. Size: 48 by 96 inches (1219 by 2438 mm).

D. Cementitious Backer Units: ASTM C 1325, Type A.
   1. Thickness: 5/8 inch (15.9 mm).

2.4 ROOF SHEATHING

A. Plywood Sheathing or Oriented-Strand-Board Sheathing as indicated on structural drawings.

2.5 PARAPET SHEATHING

A. Plywood Sheathing or Oriented-Strand-Board Sheathing as indicated on structural drawings.

B. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
   1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
   2. Size: 48 by 96 inches (1219 by 2438 mm).

2.6 SUBFLOORING AND UNDERLAMENT

A. Plywood Sheathing or Oriented-Strand-Board Sheathing as indicated on structural drawings.

B. Underlayment: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch (6.4 mm) over smooth subfloors and not less than 3/8 inch (9.5 mm) over board or uneven subfloors.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

   1. For roof, parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
   1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
   2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced and Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
   1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in the ICC’s International Building Code.
   2. Table R602.3(1), "Fastener Schedule for Structural Members;" and Table R602.3(2), "Alternate Attachments," in the ICC’s International Residential Code for One- and Two-Family Dwellings.
   3. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:
   1. Subflooring:
      a. Glue and nail to wood framing.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch (3 mm) apart at edges and ends.
2. Wall and Roof Sheathing:
   a. Nail to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.

3. Underlayment:
   a. Nail or staple to subflooring.
   b. Space panels 1/32 inch (0.8 mm) apart at edges and ends.
   c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer’s written instructions.
   1. Fasten gypsum sheathing to wood framing with screws.
   2. Fasten gypsum sheathing to cold-formed metal framing with screws.
   3. Install panels with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
   4. Install panels with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
   1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.
   2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
   1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.
   2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints according to sheathing manufacturer’s written instructions.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer’s written instructions for type of application indicated.

3.5 FIBERBOARD SHEATHING INSTALLATION

A. Comply with ASTM C 846 and with manufacturer’s written instructions.

B. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails; comply with manufacturer’s recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least 3/8 inch (9.5 mm) from edges and ends.

C. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow 1/8-inch (3-mm) open space between edges and ends of adjacent units. Stagger horizontal joints if any.

D. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.

3.6 FOAM-PLASTIC SHEATHING INSTALLATION

A. Comply with manufacturer’s written instructions.

B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.

C. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.7 PARTICLEBOARD UNDERLAYMENT INSTALLATION

A. Comply with CPA’s recommendations for type of subfloor indicated. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush.

1. Fastening Method: Glue and nail or staple underlayment to subflooring.
3.8 HARDBOARD UNDERLAYMENT INSTALLATION

A. Comply with CPA’s recommendations and hardboard manufacturer’s written instructions for preparing and applying hardboard underlayment.

1. Fastening Method: Nail or staple underlayment to subflooring.

END OF SECTION 061600
SECTION 06 82 05 – FIBERGLASS REINFORCED PLASTIC PANELING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced polyester panel system for adhesive mounting.

B. Moldings, adhesive, and joint sealants.

1.2 REFERENCES


1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Samples: For each finish specified, two complete sets of color chips representing manufacturer’s full range of available colors and patterns.
D. LEED Submittals: Complete LEED Checklist and Tracking Form, Section 01 33 00, and other data for the following LEED Credits. Requirements and definitions are located in Section 01 35 15 and Section 01 60 00.
2. Credit MR 5: List products that are extracted, harvested or recovered as well as manufactured within 500 straight-line miles of Project Site, or percent of regional material by weight. Include address and distance of material source and product manufacture. Product cost data.
3. Credit EQ 4.1: Manufacturers’ product data for adhesives and sealants, including printed statement of VOC content.
4. Credit EQ 4.2: Manufacturers’ product data for paints and coatings, including printed statement of VOC content and list of prohibited chemical quantities.

E. Maintenance Instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s absolute limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:
   1. Marlite; www.marlite.com
   2. Kemlite Company, Inc.

B. Substitutions: See Section 01 60 00 - Product Requirements.
2.2 PANEL SYSTEM


B. FRP Panels: Fiberglass reinforced polyester, USDA approved for incidental food contact.
   1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84 (Class A/I).
   2. Surface Texture: Gently pebbled, high-gloss.
   5. Width: 48 inches.
   6. Height: 96 inches.
   7. Flexural Strength: 10,000 psi, when tested in accordance with ASTM D 790.
   8. Flexural Modulus: 3,100 psi, when tested in accordance with ASTM D 790.
   9. Tensile Strength: 7,000 psi, when tested in accordance with ASTM D 638.
   10. Tensile Modulus: 1,600,000 psi, when tested in accordance with ASTM D 638.
   11. Barcol Hardness: 35, when tested in accordance with ASTM D 2583.
   13. Coefficient of Thermal Expansion: 0.0000157 in/in/degree F, measured in accordance with ASTM D 696.
   14. Water Absorption: 0.72 percent, when tested in accordance with ASTM D 570.
   15. Specific Gravity: 1.8, when tested in accordance with ASTM D 792.

C. Panel Trim: Extruded PVC, in manufacturer’s standard colors.
   1. Outside corners, inside corners, edge trim, and division molding.

D. Sealant: Manufacturer’s Silicone Sealant; gunnable silicone rubber; Match panel color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Take panels out of cartons and allow to acclimatize to room conditions for at least 48 hours prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.

D. Protect existing surfaces from damage due to installation.

3.3 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Use the adhesives recommended by the panel manufacturer unless prohibited by local regulations; obtain manufacturer’s approval of alternative adhesives.

C. Install continuous bead of silicone sealant in each joint and trim groove and between trim and adjacent construction, maintaining 1/8 inch expansion space.

D. Avoid contamination of panel faces with adhesives, solvents, or cleaners; clean as necessary and replace if not possible to repair to original condition.

E. Protect installed products until completion of project.

F. Touch-up, repair or replace damaged products after Substantial Completion.

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SECTION 07 11 00 - UNDERSLAB VAPOR BARRIER

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. This Section includes the following:

1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related Sections include the following:

1. Section 03 30 00 "Cast-in-Place Concrete”.
2. Section 14 24 00 "Hydraulic Elevators”.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. ASTM E 1745-11 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E 154-08 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
6. ASTM E 1643-11 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
1.4 SUBMITTALS

A. Quality Control/Assurance:
   1. Summary of test results per paragraph 8.3 of ASTM E 1745.
   2. Manufacturer’s samples and literature.
   3. Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.
   4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

PART 2 - PRODUCTS

2.1 VAPOR BARRIER

A. Basis-of-Design Product: Subject to compliance with requirements, provide Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com., or comparable product by one of the following:
   3. Or approved equal by Architect prior to bidding.

2.2 MATERIALS

A. Vapor barrier shall have all of the following qualities:
   1. Maintain permeance of less than 0.01 Perms as tested in accordance with conditioning tests per ASTM E 1745 Section 7.1.1-7.1.5.
   2. Other performance criteria:
      a. Strength: ASTM E 1745 Class A.
      b. Thickness: 15 mils minimum.

2.3 ACCESSORIES

   1. Seams: Stego Tape.
   2. Penetrations of Vapor Barrier: Stego Mastic and Tape.
   3. Perimeter/Edge Seal: Stego Crete Claw.
PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
   1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance ASTM E 1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of placement whenever possible.
   2. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
   3. Seal vapor barrier to slab perimeter/edge using Stego Crete Claw and remove dirt, debris, and mud from Crete Claw prior to concrete placement.
   4. Overlap joints 6 inches and seal with manufacturer’s tape.
   5. Apply tape/Crete Claw to a clean and dry vapor barrier.
   6. Seal all penetrations (including pipes) per manufacturer’s instructions.
   7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
   8. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

END OF SECTION 07 11 00
SECTION 07 19 00 - WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

A. The work covered by this section includes furnishing all labor and materials and performing all operations in connection with the application of a clear, penetrating water repellent to the following exposed vertical surfaces.

1. Unit Masonry.

1.3 RELATED SECTIONS

A. The following sections contain requirements that relate to this section:

1. Section 03 30 00 “Cast-In-Place Concrete” for curing compounds, curing and sealing compounds, and penetrating liquid floor treatments.
2. Section 04 01 10 “Masonry Cleaning” for masonry cleaning methods and materials.
3. Section 07 92 00 “Joint Sealants” for joint sealants.

1.4 SUBMITTALS

A. The general contractor shall submit the following according to the Conditions of Contract and Division 1 Specification sections.

1. Product data sheet, including manufacturer's specifications for surface preparation, application instructions and verification that the product is intended for use on each substrate to be treated.
2. MSDS sheet.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage a firm experienced in installation or application of systems similar in complexity to those required for this project, plus the following:
1. Acceptable to or licensed by the manufacturer.
2. Not less than three years experience with water repellent systems.
3. Successfully completed not less than five water repellent projects comparable in scale.

B. Manufacturers Qualifications:

1. Not less than five years experience in the actual production of specified products.
2. Provide field assistance/testing, as needed, to determine coverage rates dilution rates, and proper surface preparation.

C. Regulatory Requirements:

1. All activities and products shall be in compliance with relevant local codes and governmental regulations.

D. Tests and Approvals:

1. Manufacturer needs to perform a rilem tube test to confirm proper application and quantity of material to pass a 60 mile wind-driven rain test.
   a. The purpose of testing is to determine that the proposed product will produce the desired results at the proposed coverage rates without adversely affecting the substrate.
   b. Test areas shall be selected by the project architect.
   c. Test areas, approximately ten to twenty square feet in size, shall be treated with the proposed water repellent, at the coverage rate of recommended by the manufacturer, for inspection and approval by the project architect.
   d. A test panel shall be applied to each different substrate that is to receive the water repellent treatment.
   e. Test procedures shall include evaluation of materials and techniques proposed for protection of surrounding and adjacent surfaces which could be adversely affected by the water repellent treatment.
   f. A representative of the water repellent manufacturer shall be present during testing procedures.
   g. The project architect shall approve all test areas and application procedures prior to beginning full-scale water repellent treatment.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Shipping: Deliver products in original unopened containers with legible manufacturer’s identification.

B. Storage and Protection: Comply with manufacturer’s recommendations.
1.7 PROJECT CONDITIONS

A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions:

1. Ambient temperature is less than 40 degrees F or above 95 degrees F.
2. The ambient temperature is likely to fall below 40 degrees F within eight hours after application.
3. The substrate temperature is less than 35 degrees F.
4. The substrate has been wet within 24 hours prior to application or exposed to winter conditions during construction. Allow to dry for 30 days at 70+ degrees F.
5. Rain is expected within 24 hours after application.
6. Wind is sufficiently strong to carry airborne particles to unprotected surfaces not intended for treatment.

1.8 WARRANTY

A. Manufacturer and applicator shall warrant respective products applied in accordance with manufacturer’s specifications for a period of five years from date of substantial completion, against water intrusion due to material failure. When notified of such conditions, in writing, by the owner, the manufacturer shall provide materials, and the applicator shall provide the labor to correct said deficiencies promptly and without inconvenience or cost to the owner.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

A. Water Repellents: Clear-drying, water-based silicone emulsion for weatherproofing, and primarily non-sacrificial graffiti protection for concrete block and other porous masonry materials protecting them from graffiti attacks. No film formers are allowed.

B. Manufacturers:

1. Sure Klean Weather Seal Blok-Guard & Graffiti Control or Control II as manufactured by Prosoco.
   a. Applicator to use correct product for cool or warm temperature as recommended by Prosoco.
2. Approved equal by Architect prior to bidding.
PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to manufacturer’s instructions to ensure that surface is sufficiently dry.

B. Protect adjoining work, including sealant (caulking) bond surfaces, glass, and aluminum from overspray. Cover nearby landscaping plants. (Immediately clean adjacent surfaces exposed to overspray, using soap and water. Do not permit water repellent to dry on surfaces that are to be untreated.

C. Coordination with joint sealants: Do not apply water repellents until joint sealants have been installed and cured.

3.2 APPLICATION

A. Repellent shall be applied to relatively small sections of the masonry in two consecutive, saturating applications (referred to as “wet-on-wet”) with a six to eight inch run down.

1. Atlas Brick Masonry Units (Exterior): Apply at rate of 75-100 sq. ft. a gallon.
2. Emperor Brick Masonry Units (Veneer): Apply at a rate of 75-100 sq. ft. a gallon.
3. Natural Stone Thin Veneer: As recommended for product.

B. Apply repellent in strict accordance with manufacturer’s data sheet. Repellent is to be applied from bottom to top of wall in each section.

C. Allow two to three minutes absorption time between wet-on-wet coats.

D. Avoid excessive overlapping and take care to brush out runs and drips to avoid build up of material on honed block surfaces or pre-cast.

E. Apply sealer using a low pressure sprayer. Make sure pressure is low enough to prevent atomizing the material. Use sufficient quantity of material to produce uniform saturating coverage.

F. Repellent to be applied to full height of masonry.

END OF SECTION 07 19 00
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. This Section includes the following:
      1. Foam-Plastic Board Insulation.
      2. Foamed-In-Place Insulation.
      5. Acoustical Insulation.

   B. Related Sections include the following:
      1. Section 07 46 46 “Fiber-Cement Siding” for installation in exterior wall assemblies of insulation specified in referencing this section.
      2. Section 07 54 23 “Thermoplastic Polyolefin (TPO)” for insulation specified as part of roofing construction.
      3. Section 09 21 16 “Gypsum Board Assemblies” for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 DEFINITIONS
   A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 PERFORMANCE REQUIREMENTS
   A. Plenum Rating: Provide glass and slag-wool-fiber/rock-wool-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per “Erosion Test” and “Mold Growth and Humidity Test” described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
      1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm (13-m/s) air velocity.
2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with Chaetomium globosium on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.5 **SUBMITTALS**

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

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.6 **QUALITY ASSURANCE**

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.


1.7 **DELIVERY, STORAGE, AND HANDLING**

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer’s written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board (XPS) Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. DiversiFoam Products.
   b. Dow Chemical Company.
   c. Owens Corning.
   d. Pactiv Building Products.

2. Type IV, 25 psi.
3. Insulation used for foundation walls and exterior veneer.

2.3 FOAMED-IN-PLACE INSULATION

A. Open-Cell Polyurethane Foam Insulation: ASTM 1029, Type II, with maximum flame-spread and smoke developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Basis-of-Design: Subject to compliance with requirements, provide Johns Manville open-cell spray polyurethane foam or product by one of the following manufacturers:
   a. BASF Corp.
   b. Dow Chemical Company.
   c. Icynene.

2. Insulation used between masonry and furring from floor to deck (Exterior Walls).
   a. Meets criteria of 488 Btu/ft² (5.5 MJ/m²) per inch of thickness.

2.4 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Insulation used for sound.

C. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

1. Insulation used as reinforced scrim over batt insulation.
   
   a. Provide foil-backed tape to joints where exposed.

D. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:

1. 6-1/4 inches (158.75 mm) thick with a thermal resistance of 19, or as indicated on drawings.

2.5 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.
4. U.S.G.

B. Unfaced, (Mineral-Wool) Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Where mineral-wool blanket insulation is indicated by the following thicknesses, provide blankets in batt form with thermal resistances indicated:

1. 4 inches (101 mm) thick with a thermal resistance of 16, or as indicated on drawings.

   a. Insulation used as safing insulation. Safing insulation between walls and deck at rated corridor must be secured in place with firestopping spray.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer’s written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Provide sizes to fit applications indicated and selected from manufacturer’s standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units according to manufacturer’s written instructions.

B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer’s written instructions. Stagger end joints and tightly abut insulation units.

C. Protect below-grade insulation on vertical surfaces from damage during backfilling.

D. Protect top surface of horizontal insulation from damage during concrete work.

3.3 INSTALLATION OF CAVITY-WALL INSTALLATION

A. Foam-Plastic Board Insulation: Install pads of adhesive, spaced as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press firmly against inside substrates.

3.4 INSTALLATION OF FOAMED-IN-PLACE INSULATION

A. Foamed-In-Place Insulation: Apply sprayed-applied insulation according to manufacturer’s written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer’s written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.6 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer’s written instructions. Space anchors according to insulation manufacturer’s written instructions for insulation type, thickness, and application indicated.
2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
3.7 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

B. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.8 INSTALLATION OF SAFING INSULATION

A. Stuff safing insulation to fill voids and cavity spaces. Compact to approximately 40 percent of normal maximum volume.

3.9 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00
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. This Section includes the following:

1. Building wrap.
2. Flexible flashing.

B. Related Sections include the following:

1. Section 06 16 00 ‘Sheathing’ for sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:

a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
b. Pactiv, Inc.; GreenGuard Classic Wrap.

2. Water-Vapor Permeance: Not less than 20 perms (1150 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A).

3. Allowable UV Exposure Time: Not less than three months.

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, thickness of not less than 20 mil. Provide flexible flashing as recommended by manufacturer of building wrap.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
   c. Pactiv, Inc.; GreenGuard Flashing.
   d. Protecto Wrap Company; BT-25 XL.
   e. Raven Industries Inc.; Fortress Flashshield.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Building Wrap: Comply with manufacturer’s written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer’s written instructions.

1. Prime substrates as recommended by flashing manufacturer.

END OF SECTION 07 25 00
SECTION 07 42 13 - METAL SOFFIT AND FASCIA WALL PANELS

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. Section Includes:
      1. Metal soffit panels.
      2. Metal fascia wall panels.
      3. Underlayment materials.
   B. Related Sections:
      1. Section 061600 "Sheathing".
      2. Section 076200 "Sheet Metal Flashing and Trim" for field-formed copings, flashings, and other sheet metal work not part of metal panel assemblies.
      3. Section 079200 "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 PERFORMANCE REQUIREMENTS
   A. General Performance: Metal panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

   B. Air Infiltration: Air leakage through assembly of not more than 0.016 cfm/sq. ft. (0.3 L/s per sq. m) of area when tested according to ASTM E 1680 at the following test-pressure difference:
      1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft. (75 Pa).

   C. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
      1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12.0 lbf/sq. ft. (575 Pa).
      2. No leakage.

   D. Wind-Uplift Resistance: Provide metal panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 90.

1.4 SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation layouts of metal soffit and fascia wall panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches (300 mm) long by actual panel width of either 12' or 16'. Include fasteners, clips, battens, closures, and other metal panel accessories.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal panels from single source from single manufacturer.

D. Surface-Burning Characteristics: Provide metal panels with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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

E. Mockups: Build adequate mockup to provide visual display of metal fascia wall panel and metal soffit panel. Mockup to be a minimum of three vertical joint fascia panels and three soffit panels.

1. Mockup to be approved by Owner and Architect.

F. Pre-Installation Conference: Conduct conference at project site.

1. Prior to fabrication and installation of metal fascia wall panels and metal soffit panels, a pre-installation meeting will be held with Owner, Architect, Contractor, and Installer for review of substrate framing and flatness.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal panels from exposure to sunlight and high humidity, except to extent necessary for period of metal panel installation.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal panel work to be performed according to manufacturer’s written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal panels by field measurements before fabrication.

1.8 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Twenty-five (25) years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer’s standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: Thirty-five (35) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape as required by metal panel manufacturer.

2. Joint Sealant: ASTM C 920; elastomeric polyurethane, of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.


2.2 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

1. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels. Panel shall be a flush-soffit panel by one of the following approved manufacturers:

   a. AEP-Span.
   b. Berridge.
   c. Englert.
   d. Fabral.
   e. Firestone.


4. Panels shall be factory formed in continuous lengths (maximum 40 ft.).

5. Seam spacing shall be 12” o.c.

6. Attachment to solid sheathing with screws.
2.3  METAL FASCIA WALL PANELS

A.  General:  Panels to be cut to match profile of entrance canopy.  Joint lines to follow profile as shown on drawings.  Attach by using concealed fasteners and provide required backing/blocking.  Use factory-applied sealant in side laps.  Provide for weathertight installation.

1.  Metal Fascia Wall Panels:  Panels to be 1/2" flush flat panel without stiffening ridge.  Provide custom flat-lock joint seam.  Refer to drawings.  Metal Fascia Wall Panels to be provided from one of the following approved manufacturer’s.
   a.  AEP-Span.
   b.  Berridge.
   c.  Englert.
   d.  Fabral.
   e.  Firestone.


3.  Surface:  Flat panel.
4.  Panels shall be factory formed in continuous lengths (maximum 40 ft.).
5.  Seam spacing shall be t&g flat fascia panel.  See drawings for module spacing.
6.  Attachment to solid sheathing with screws.

2.4  UNDERLAYMENT MATERIALS

A.  Self-Adhering, High-Temperature Sheet:  30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied.  Provide primer when recommended by underlayment manufacturer.

2.  Low-Temperature Flexibility:  Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3.  Products:  Provide underlayment product from one of the following manufacturer’s:
   a.  Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.
   b.  Englert HT.
   c.  Grace Construction Products; “Ice & Water Shield”.
   d.  Henry Company.
   e.  Owens Corning.
   f.  Polyguard; “Polyguard HT”.

4.  Install in strict accordance with manufacturer’s recommendations.
5.  Install at locations as shown on drawings.
2.5 ACCESSORIES

A. Panel Accessories: Except as indicated as work of another specification section, provide components approved by panel manufacturer and as required for a complete metal panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

2.6 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory to greatest extent possible, by manufacturer’s standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA’s "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA’s "Architectural Sheet Metal Manual" or by metal panel manufacturer for application, but not less than thickness of metal being secured.

2.7 FINISHES

A. Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces (flatstock to form flashing and trim) from damage by applying a strippable, temporary protective covering before shipping. Coil that is used to form the metal soffit panels on-site is shipped without strippable film.
C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

3.3 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.

B. Metal Soffit Panels: Provide metal soffit panel full width of soffits. Install panel perpendicular to support framing.

1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.4 METAL FASCIA WALL PANEL INSTALLATION

A. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal fascia wall panels to comply with requirements in this article.

B. Metal Fascia Wall Panels: Install metal panels according to manufacturer’s written instructions. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Fascia wall panels to be cut as shown on drawings. Install metal fascia wall panels using concealed fasteners and provide required backing/blocking.

2. Seal panels with weather closures where metal fascia wall panels meet adjoining metal panels.

3. Minimize “oil-canning”.
3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

3.6 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer’s written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13
SECTION 07 46 46 - FIBER-CEMENT SIDING

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. Section includes exterior, panelized fiber-cement cladding system and accessories to complete a drained and back-ventilated rainscreen.

B. Related Requirements:
   1. Section 06 10 00 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
   2. Section 06 16 00 “Sheathing”
   3. Section 07 20 00 “Thermal Insulation”
   4. Section 07 25 00 ’Weather Barriers' for weather-resistant barriers.
   5. Section 07 62 00 “Sheet Metal Flashing and Trim”
   6. Section 07 90 00 “Joint Sealants”

1.3 COORDINATION
A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.4 PREINSTALLATION MEETINGS
A. Pre-installation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: For fiber-cement siding including related accessories.

C. Samples for Verification: For each type, color, texture, and pattern required.
   1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.6 INFORMATIONAL SUBMITTALS
   A. Product Certificates: For each type of fiber-cement siding.
   B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
   C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.
   D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      1. Furnish full lengths of fiber-cement siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.9 QUALITY ASSURANCE
   A. Manufacturer Qualifications:
      1. All fiber cement siding/panels specified in this section must be supplied by a manufacturer with a minimum of 10 years of experience in fabricating and supplying fiber cement fiber cement cladding systems.
         a. Products covered under this section are to be manufactured in an ISO 9001 certified facility.
      2. Provide technical and design support as needed regarding installation requirements and warranty compliance provisions.
   B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained by manufacturer or representative.
   C. Mockup Wall: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
      1. Build mockup of typical wall area as shown on Drawings.
      2. Build mockups for fiber-cement cladding including accessories.
a. Size: 48 inches (1200 mm) long by 60 inches (1800 mm) high.
b. Include outside corner on one end of mockup and inside corner on other end.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store packaged materials in original containers with labels intact until time of use.
B. Store materials flat on elevated platforms, under cover, and in a dry location.
C. Panels must be carried on edge. Do not carry or lift panels flat. Improper handling may cause cracking or panel damage.

1.11 WARRANTY
A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including cracking and deforming.
      b. Deterioration of materials beyond normal weathering.
   2. Warranty Period: 50-year warranty against manufactured defects in fiber cement panels from date of Substantial Completion.
   3. Warranty Period for panel finish: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Nichiha USA, Inc. 6465 E. Johns Crossing, Suite 250, Johns Creek, GA 30097. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.
2.2 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Drained and Back Ventilation Rainscreen (AAMA 509-09): System must pass all component tests.

D. Nominal Thickness: Not less than 5/8 inch (16 mm).

E. Factory Sealed on six (6) sides.

F. Siding/Panel Schedule:

FC-1: Basis-of-Design Product: Nichiha Architectural Block Series.
Profile: AWP-1818
Size: 17-7/8”(H) x 71-9/16”(L)
Color: Gray

Profile: AWP-3030 Panel
Size: 17-7/8”(H) x 119-5/16”(L)
Color: Redwood
Finish: wood texture.

Profile: AWP-1818 Panel
Color: Stacked Stone Mountain

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter track, panel clips, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
1. Manufactured Corners with 3-1/2” returns for each profile size and color.
2. Aluminum trim to be painted per finish schedule. Outside corners (Corner key, Open Outside Corner), vertical joints (H-mold), terminations (J-mold).
C. Flashing: Provide flashing complying with Section 07 62 00 “Sheet Metal Flashing and Trim” at windows, doors, wall bottoms, material transitions and penetrations or as specified in manufacturer’s instructions. Do not use raw aluminum flashing. Flashing must be galvanized, anodized, or PVC coated.

D. Sealant: Sealant shall comply with ASTM C920.

E. Installation Components:

1. Ultimate Clip System:
   a. Starter Track:
      1) Horizontal Panel Instructions – FA 700 – 3.030mm (l) galvalume.
      2) Vertical Panel Installation (AWP-3030 only) – FA 710T – 3.03mm (l) galvalume.
   b. Panel Clips: JEL 777 “Ultimate Clip” (10mm rainscreen for 16mm AWP) – Zinc-Aluminum-Magnesium alloy coated steel.
      1) Joint Tab Attachments – use at all AWP-1818 panel to panel vertical joints – NOT used with AWP-3030 installations.
   c. Single Flange Sealant Backer – FHK 1017 (10mm) – 6.5’ (l) fluoride coated galvalume.
   d. Double Flange Sealant Backer – FH 1020 (10mm) – 10’ (l) fluoride coated galvalume.
   e. Corrugated Spacer – FS 1005 (5mm), FS 1010 (10mm) – 4’ (l).
   f. Finish Clip – JE310 (5mm).

2. Aluminum Trim – Paint as specified in finish schedule.

3. Essential Flashing System: Starter, Compression Joint, Overhang.

4. Fasteners: Corrosion resistant hot-dipped galvanized fasteners. Do not use aluminum fasteners, staples or fasteners that are not rated or designated for intended use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
C. Allowable stud spacing: 16” o.c. maximum.

D. A weather resistive barrier is required when installing fiber cement panels.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with manufacturer’s latest written installation instructions applicable to products and applications indicated unless more stringent requirements apply. Review all manufacturer installation, maintenance instruction, and other applicable documents before installation.

1. Consult with your local dealer or Nichihia Technical Department before installing any fiber cement product. Special installation conditions may be required via a Technical Review and Special Applications Form process.

2. Vertical Control/Expansion Joints are required within 2-10 feet of outside corners finished with metal trim and approximately every 30 feet thereafter.

3. Horizontal/Compression Joints are required for multi-story installations of AWP. Locate joints at floor lines. Joints are flashed minimum ½” breaks. Do not caulk. Refer to installation guides.
   a. Provide a compression joint at each floor per installation instruction.

B. Panel Cutting

1. Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.

C. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and manufacturers instructions to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements. Clean finished surfaces according to manufacturer’s written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46
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. Section Includes:
   1. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.

B. Related Requirements:
   1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
   2. Section 07 62 00 “Sheet Metal Flashing and Trim” for metal roof flashings and counterflashings.
   3. Section 07 92 00 “Joint Sealants” for joint sealants, joint fillers, and joint preparation.
   4. See Mechanical drawings for roof drains.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA’s “The NRCA Roofing and Waterproofing Manual” apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
   1. Meet with Owner, Architect, Owner’s insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer’s representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer’s written instructions.
   3. Review and finalize construction schedule, and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner’s insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer’s representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer’s written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color required.
2. Aggregate surfacing material in gradation and color required.
3. Roof paver, full sized, in each color and texture required.
4. Walkway pads or rolls, of color required.
1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer’s special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer’s product and that is eligible to receive manufacturer’s special warranty.

C. Source Limitations: Obtain components including fasteners from membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

D. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer’s name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer’s written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer’s written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer’s standard or customized form, without monetary limitation, in which Manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. No exclusions for ponding water.

1. Special warranty includes roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of roofing system.

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

3. 99 mph wind speed warranty.

B. Special Project Warranty: “General Contractor and roofing sub-contractor shall jointly agree, for a period of two (2) years after the date of substantial completion, to inspect and make immediate emergency temporary repairs as required to stop leaks or correct defects in the roofing system work, including attachments to metal flashings forming an integral part of the roofing, within three working days of notice received from the owner; and further agree to make permanent repairs to restore the affected items to the standards of construction required by these specifications within reasonable time and as weather conditions permit; and further agree to make sure temporary and permanent repairs without reference to or consideration of the cause or nature of such leaks or defects in the waterproofing work. In case of defective roofing work, damage caused by leaks or by their repair, shall also be repaired. Work required within the period shall be completed without cost to the owner, except that repair work is required because of Acts of God, abuse or alteration by owner, alteration or failure of the substrate or supporting structure
(other than that caused by defects in the roofing work) This agreement and the enforcement of its provisions shall not deprive the owner of any action, right or remedy otherwise available to him”

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. Carlisle SynTec Incorporated: Sure-Weld Thermoplastic Polyolefin (TPO)
   2. Firestone Building Products Company: UltraPly TPO.
   3. Versico Incorporated: VersiWeld TPO

B. Source Limitations: Obtain components including roof insulation, fasteners for roofing system from manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
   1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
   2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global’s “RoofNav” for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
   1. Fire/Windstorm Classification: Class 1A-90.
   2. Hail-Resistance Rating: MH.

D. Energy Star Listing: Roofing system shall be listed on the DOE’s ENERGY STAR “Roof Products Qualified Product List” for low-slope roof products.

E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

   1. Thickness: 60 mils, nominal.
   2. Exposed Face Color: White.

2.4 AIR/VAPOR BARRIER

A. 32 mil (0.8 mm) self-adhesive vapor barrier that can serve as a temporary roof protection. Basis of Design: Sarnavap Self-Adhered.

2.5 INSULATION/ROOF BOARDS

A. Substrate Board: Rigid polyisocyanurate with black mat faces 4’x8’ installed in two layers per thickness indicated on drawings.

B. Hardboard: Cover board thickness 1/2” Dens Deck or Securock.

2.6 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

B. Sheet Flashing: Manufacturer’s standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer’s standard.

D. Slip Sheet: Manufacturer’s standard, of thickness required for application.

E. Metal Termination Bars: Manufacturer’s standard, predrilled stainless-steel or aluminum bars, approximately 1 & 1/2 inch wide by 1/8 inch (25 by 3 mm) thick; with anchors.

F. Metal Battens: Manufacturer’s standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 & ½ inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick), prepunched.
G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.7 WALKWAY ROOF PAVERS

A. Walkway Roof Pavers: Heavyweight, hydraulically pressed concrete units, with top edges beveled 3/16 inch (5 mm), factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:

B. Subject to compliance with requirements, provide products by one of the following:
   1. Approved Manufacturers:
      a. Roofbloc Limited.
      b. Sunny Brook Precast
      c. Wausau Tile Inc.
      d. Westile Roofing Products
   2. Size: 24 inch by 24 inch x 2 inch thick. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch (1.6 mm) in length, height, and thickness.
   3. Weight: 18 lb/sq. ft. (90 kg/sq. m)
   4. Compressive Strength: 6500 psi (45 MPa), minimum.
   5. Colors and Textures: As selected by Architect from manufacturer’s full range.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

   1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
   4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   5. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install insulation strips according to acoustical roof deck manufacturer’s written instructions.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer’s written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 MECHANICALLY FASTENED ROOFING INSTALLATION

A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer’s written instructions. Unroll roofing and allow to relax before retaining.

1. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.

B. Start installation of roofing in presence of roofing system manufacturer’s technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.

E. Apply roofing with side laps shingled with slope of roof deck where possible.

F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.
G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer’s written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer’s written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 WALKWAY INSTALLATION

A. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer’s written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.

3.7 FIELD QUALITY CONTROL

A. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of base flashing.
2. Flood each area for 48 hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

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

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

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

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

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

3.9 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _______________________________ of ___________________, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <Insert name of Owner>.
2. Address: <Insert address>.
3. Building Name/Type: <Insert information>.
4. Address: <Insert address>.
5. Area of Work: <Insert information>.
6. Acceptance Date: ________________.
7. Warranty Period: <Insert time>.
8. Expiration Date: __________________.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be
made such repairs to or replacements of said work as are necessary to correct faulty and
defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the
   building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding 99 mph;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive
deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment
supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance
personnel, other persons, and animals, whether authorized or unauthorized by
Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void
   until such damage has been repaired by Roofing Installer and until cost and expense
thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not
   liable for consequential damages to building or building contents resulting from leaks or
faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing
Installer, including cutting, patching, and maintenance in connection with penetrations,
attachment of other work, and positioning of anything on roof, this Warranty shall become
null and void on date of said alterations, but only to the extent said alterations affect work
covered by this Warranty. If Owner engages Roofing Installer to perform said alterations,
Warranty shall not become null and void unless Roofing Installer, before starting said
work, shall have notified Owner in writing, showing reasonable cause for claim, that said
alterations would likely damage or deteriorate work, thereby reasonably justifying a
limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was
not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin,
or other use or service more severe than originally specified, this Warranty shall become
null and void on date of said change, but only to the extent said change affects work
covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks,
defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to
inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and
shall not operate to restrict or cut off Owner from other remedies and resources lawfully
available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate
to relieve Roofing Installer of responsibility for performance of original work according to
requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner’s General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _________ day of ____________________, ________________.

1. Authorized Signature: _______________________________________.
2. Name: ________________________________________.
3. Title: ________________________________________.

END OF SECTION 07 54 23
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. Section Includes:
   1. Exposed trim, gravel stops, and fascia.
   2. Roof expansion joints.
   3. Reglets.
   5. Metal flashing.

B. Related Sections:
   1. Section 06 10 00 “Rough Carpentry” for wood nailers, curbs, and blocking.
   2. Section 07 54 23 “Thermoplastic-Polyolefin (TPO) Roofing” for roofing types and roofing accessories included as part of roofing work.

1.3 PERFORMANCE REQUIREMENTS

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

B. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
   1. Wind Zone 1: For velocity pressures of 10 to 20-lbf/sq. ft.: 40-lbf/sq. ft. perimeter uplift force, 60-lbf/sq.ft. corner uplift force, and 20-lbf/sq. ft outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base the engineering calculations on surface temperatures of materials due to both solar heat gain and night-time sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

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

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
   1. Details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.
   2. Identify material, thickness, weight, and finish for each item and location in Project.

C. Samples: For each exposed product and for each finish specified with factory applied color finish.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
   2. Trim: 12 inches long. Include fasteners and other exposed accessories.

E. Maintenance data.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA’s "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
C. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

D. Stack materials on platforms or pallets, covered with suitable weather tight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

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

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak proof, secure, and noncorrosive installation.

1.8 WARRANTY

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

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

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

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

A. Provide pre-painted Sheet Metal Flashing at all areas exposed/viewable to public.

B. Provide galvanized metal flashing at areas not exposed/viewable to public.

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

D. Pre-painted Sheet Metal (Exposed Trim, Gravel Stops, Fascia, and Expansion Joint Covers): 24 gauge hot dipped galvanized Steel (G-90) commercial quality, extra smooth primed and finished
one side with Kynar based fluoropolymer coating 1.0 mil total dry film thickness with a strippable film protective cover. Reverse side, wash coat of .3-.4 mil dry film thickness.

2. Color: To match existing or as selected by Architect.

E. Zinc-coated Steel (All other sheet metal): Commercial quality with 0.20% copper, ASTM A 526, except ASTM A 527 for lock-forming, G90 hot-dip galvanized; 0.0359 inch thick (20 gauge); except as otherwise indicated.

F. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required. Interior of Skylight curbs.
   1. Exposed Coil Coated Finishes:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
      1) Color: White.

2.2 UNDERLAYMENT MATERIALS


B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.

C. Slip Sheet: Rosin-sized paper, minimum 3 lb./100 sq. ft.

2.3 MISCELLANEOUS MATERIALS

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

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
      c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
C. Solder:
  1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, 60 percent tin and 40 percent lead with low antimony, as recommended by manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Bituminous Coating: Cold-applied asphalt mastic complying with ASTM D 1187, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.


H. Elastic Sheet Flashing/Membrane: Nonreinforced flexible, black elastic sheet flashing of 50 to 65 mils’ thickness.
  1. Acceptable Products:
     a. Neoprene synthetic rubber sheet.
     b. Butyl synthetic rubber sheet.
     c. EPDM synthetic rubber sheet.

I. Batt Insulation: Comply with ASTM C 665 for Type I. Thickness as required to fill void at building expansion joints.

J. Galvanizing Repair Paint: ZRC Cold Galvanizing Compound as manufactured by ZRC Worldwide, Marshfield, Mass. (800) 831-3275.

2.4 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

B. Surface-Mounted Type: Type SM with Springlok Flashing System, as manufactured by Fry Reglet Corporation, or equivalent system/item as manufactured by other acceptable manufacturers.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  1. Cheney Flashing Company, Inc.
  2. Fry Reglet Corporation.
  3. Heckmann Building Products Inc.

2.5 FABRICATION, GENERAL

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

B. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems

1. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges of zinc-coated steel sheet to be seamed, form seams, and solder.

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

D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

E. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

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

1. Thickness: As recommended by SMACNA’s "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

G. Roof Edge Flashing and Fascia Caps: Fabricate of dimensions and shape indicated. Furnish with continuous cleats.

H. Roof Expansion Joints: Provide fabricated units of size and profile indicated, complete with fabricated corner units, intersection units, and tapered edge termination units, as required.

1. Include elastic sheet flashing material and batt insulation, as indicated.

2.6 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 120-inch- (3048-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm)
beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams where flashing is discontinuous. Fabricate from the following materials:


B. Wall Expansion-Joint Cover: Fabricate from the following materials:


PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
   1. Do not solder metallic-coated steel and aluminum sheet.
   2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
   3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer’s recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.2 ROOF FLASHING INSTALLATION

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

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA’s “Architectural Sheet Metal Manual” and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA’s “Architectural Sheet Metal Manual” and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 12-inch (305-mm) centers.
   2. Anchor interior leg of coping with washers and screw fasteners through holes at 12-inch (305-mm) centers.
   3. Corners and Joints must have 1” standing seams.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.
F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

G. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Seal flashing with elastomeric sealant to equipment support member.

3.3 CLEANING AND PROTECTION

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

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

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer’s written installation instructions. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
   1. Touch-up abraded areas where zinc coating has been damaged with galvanizing repair paint applied in accordance with manufacturer’s recommendations.

END OF SECTION 07 62 00
SECTION 07 71 00 - ROOF SPECIALTIES

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. Section Includes:
   1. Copings.
   2. Roof-edge specialties.
   3. Roof-edge drainage systems.
   4. Reglets and counterflashings.

B. Related Requirements:
   1. Section 05 50 00 "Metal Fabrications" for metal ladder.
   2. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
   3. Section 07 62 00 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
   4. Section 07 92 00 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner’s insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer’s representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
   2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Shop Drawings: For roof specialties.
   1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
   2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
   3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
   4. Detail termination points and assemblies, including fixed points.
   5. Include details of special conditions.

C. Samples: For each type of roof specialty and for each color and texture specified.

D. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

E. Samples for Verification:
   1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer’s standard sizes.
   2. Include copings, roof-edge specialties, roof-edge drainage systems, reglets and counterflashings made from 12-inch (300-mm) lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of roof specialty.

C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.

D. Sample Warranty: For manufacturer’s special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty.
1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 076200 “Sheet Metal Flashing and Trim”.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
C. FM Approvals’ Listing: Manufacture and install copings and roof-edge specialties that are listed in FM Approvals’ ‘RoofNav’ and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals’ markings.

D. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient.

2.2 ROOF-EDGE DRAINAGE SYSTEMS

A. Splash Pans: Fabricate from the following exposed metal:

1. Zinc-Coated Steel: Nominal 0.034-inch (0.86-mm) thickness.
2. Manufacturers offer a variety of other roof-edge drainage-system components; insert components to suit Project.

B. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer’s full range.

2.3 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.
2. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
4. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
1. Zinc-Coated Steel: Nominal 0.022-inch (0.56-mm) thickness.

C. Accessories:
   1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
   2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

D. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
   1. Color: As selected by Architect from manufacturer’s full range.

2.4 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

E. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer’s recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
   1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
   2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.
2.6 FINISHES

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Galvanized-Steel Sheet Finishes:
   1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A 755/A 755M and coating and resin manufacturers' written instructions.
      a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

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

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer’s written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

   1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

   1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
   2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

### 3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer’s required devices, fasteners, and fastener spacing to meet performance requirements.
1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at 30-inch (762-mm) centers.
2. Interlock face-leg drip edge into continuous cleat anchored to substrate at 24-inch (610-mm) centers. Anchor back leg of coping with screw fasteners and elastomeric washers at 24-inch (610-mm) centers.

3.4 **ROOF-EDGE SPECIALTIES INSTALLATION**

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer’s required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 **REGLET AND COUNTERFLASHING INSTALLATION**

A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflash joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.6 **CLEANING AND PROTECTION**

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

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

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00
SECTION 07 72 00 – ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured curbs & equipment rails.

B. Roof access hatches.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

PART 2 - PRODUCTS

2.1 MANUFACTURED CURBS

A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:

B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
   1. Sheet Metal: Hot-dip aluminum zinc alloy coated steel sheet (Galvalume) complying with ASTM A 792/A 792M; AZ55 coating designation; 18 gage, 0.048 inch thick.
   2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches.
3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
4. Provide the layouts and configurations shown on the drawings.

C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
   1. Provide preservative treated wood nailers along top of curb.
   2. Insulate inside curbs with 1-1/2 inch thick extruded polystyrene insulation.
   3. Height Above Finished Roof Surface: 6 inches, minimum.
   4. Height Above Roof Deck: 14 inches, minimum.

D. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches square unless otherwise indicated.
   1. Provide sliding channel welded along top edge with adjustable height steel bracket, manufactured to fit item supported.
   2. Height Above Finished Roof Surface: 6 inches, minimum.
   3. Height Above Roof Deck: 14 inches, minimum.

2.2 ROOF ACCESS HATCHES, MANUAL AND AUTOMATIC OPERATION

A. Manufacturers - Roof Access Hatches:

B. Roof Access Hatches: Factory-assembled fully galvanized steel frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting on flat roof deck.
   4. Features: Exterior release for fire department access; perimeter frame integral safety railings; multiple latch points providing air-tight seal.

C. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Material: Galvanized steel, 14 gage, 0.0747 inch thick.
   3. Insulation: 1 inch rigid glass fiber, located on outside face of curb.
   4. Curb Height: 12 inches from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf live load.
   2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
   4. Insulation: 1 inch rigid glass fiber.
5. Gasket: Neoprene, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
   1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
   2. Hinges: Heavy duty pintle type.
   3. Hold open arm with vinyl-coated handle for manual release.

PART 3 — EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Follow manufacturer’s printed instructions.

3.4 CLEANING AND PROTECTION

A. Clean installed work to like-new condition.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 72 00
SECTION 07 84 13 - PENETRATION FIRESTOPPING

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. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

B. Related Sections include the following:

1. Section 07 84 66 “Fire-Resistive Joint Systems”.

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration 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.

1. Only tested firestop systems shall be used in specific locations as follows:

   a. Penetrations for the passage of duct, cable, cable tray, conduit piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

   b. Safing slot gaps between edge of floor slabs and curtain walls.

   c. Openings between structurally separate sections of walls or floors.

   d. Gaps between the top of the walls and ceiling or roof assemblies.

   e. Expansion joints in walls and floors.

   f. Openings and penetrations in fire-rated partitions or walls containing fire doors.

   g. Openings around structural members which penetrate floors or walls.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. For through-penetration 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 for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
   2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) 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.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

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

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

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

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

   1. Types of penetrating items.
   2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
   3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
D. Qualification Data: For Installer.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing through-penetration 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 through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistant joint systems in Project to a single qualified installer.

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

D. Fire-Test-Response Characteristics: Provide through-penetration 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 UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

   a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

   b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

      1) UL in its "Fire Resistance Directory."

E. Preinstallation Conference: Conduct conference at Project site.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration 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 through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.8 PROJECT CONDITIONS

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

B. Do not use materials that contain flammable solvents.

C. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

1.9 COORDINATION

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

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

C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner’s inspecting agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3. Specification based on Hilti, Inc.:

1. Nelson Firestop Products.
2. NUCO Inc.
3. RectorSeal Corporation (The).
4. Specified Technologies Inc.
5. 3M; Fire Protection Products Division.
6. USG Corporation.

2.2 FIRESTOPPING, GENERAL

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

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials. Fill materials are those referred to in directories of referenced testing and inspecting agencies as “fill”, “void”, or “cavity” materials. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

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. Fillers for sealants.

2. Temporary forming materials.
3. Collars.
4. Steel sleeves.

C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
   2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration 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.

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 PREPARATION

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

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer’s recommendations for temperature and humidity conditions before, during, and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.3 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.4 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply 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. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner’s inspector will inspect through-penetration firestops. Inspector shall comply with ASTM E2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 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 through-penetration 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 through-penetration 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 through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Cast-in-place firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and cable bundles penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In-Place Firestop Device. Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
2. Hilti CP 681 Tub Box Kit for use with tub installations.
3. Hilti CP 682 Cast-In-Place Firestop Device for use with noncombustible penetrants.

B. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Firestop Sealant
5. Hilti CP 601s Elastomeric Firestop Sealant

C. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
2. Hilti CP 606 Flexible Firestop Sealant
3. Hilti FS-ONE Intumescent Firestop Sealant

D. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti CP 672 Speed Spray
2. Hilti CP 601s Elastomeric Firestop Sealant
3. Hilti CP 606 Flexible Firestop Sealant
4. Hilti CP 604 Self-leveling Firestop Sealant

E. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.

1. Hilti CP 777 Speed Plugs
2. Hilti CP 767 Speed Strips

F. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

G. Foams, intumescent sealants, or caulking materials for use with cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 620 Fire Foam
3. Hilti CP 601s Elastomeric Firestop Sealant
4. Hilti CP 606 Flexible Firestop Sealant

H. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Firestop Putty Stick
2. Hilti CP 658T Firestop Plug

I. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Firestop Putty Pad
J. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 643 N Firestop Collar
2. Hilti CP 644 Firestop Collar
3. Hilti CP 645/648 Wrap Strips

K. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti CP 637 Firestop Mortar
2. Hilti FS 657 FIRE BLOCK
3. Hilti CP 620 Fire Foam
4. Hilti CP 675T Firestop Board

L. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK
2. Hilti CP 675T Firestop Board

M. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:

1. Hilti CP 672 Speed Spray
2. Hilti CP 601s Elastomeric Firestop Sealant
3. Hilti CP 606 Flexible Firestop Sealant
4. Hilti CP 604 Self-Leveling Firestop Sealant

N. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK
2. Hilti CP 658T Firestop Plug

O. Provide a firestop system with a “F” Rating as determined by UL 1479 or ASTM E 814 which is equal to the time rating of construction being penetrated.

P. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

END OF SECTION 07 84 13
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. This Section includes fire-resistive joint systems for the following:
   1. Floor-to-floor joints.
   2. Floor-to-wall joints.
   3. Head-of-wall joints.
   4. Wall-to-wall joints.
   5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.

B. Related Sections include the following:
   1. Section 07 21 00 “Thermal Insulation” for floor-to-wall joints indicated as perimeter fire-containment systems between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated exterior curtain walls.
   2. Section 07 84 13 “Penetration Firestopping” for systems installed in openings in walls and floors with and without penetrating items.
   3. Section 07 92 00 “Joint Sealants” for non-fire-resistive joint sealants.

1.3 PERFORMANCE REQUIREMENTS
A. General: Provide fire-resistive joint 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 assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction as determined by UL 2079.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 3, as determined by UBC Standard 26-9, NFPA 285 and UL 2079.
1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

2. OPL-Listed, Perimeter Fire-Barrier Systems: F-ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

1.4 SUBMITTALS

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

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

D. Qualification Data: For Installer.

E. Field quality-control test reports.


G. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.5 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.6 QUALITY ASSURANCE

A. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.

2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
   a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
   b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.7 DELIVERY, STORAGE, AND HANDLING

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

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

1.8 PROJECT CONDITIONS

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

B. Ventilate fire-resistive joint systems per manufacturer’s written instructions by natural means or, if this is inadequate, forced-air circulation.

1.9 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
C. Notify Owner’s inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner’s inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the fire-resistive joint systems indicated for each application in the Fire-Resistive Joint System Schedule at the end of this Section. Specification section based on Hilti, Inc. or otherwise listed. Equal by approved manufacturer’s as follows:

1. Nelson Firestop Products.
2. NUCO Inc.
3. RectorSeal Corporation (The).
4. Specified Technologies Inc.
5. 3M; Fire Protection Products Division.
6. USG Corporation.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer’s written instructions and the following requirements:

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

B. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system 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 fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system’s seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer’s written installation instructions for products and applications indicated.

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

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed
with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

D. Additional inspecting, at Contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.5 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint 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 fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.6 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Use only firestop products that have been tested in accordance with ASTM E 1966 and/or ANSI/UL 2079 for specific rated construction conditions conforming to construction assembly type, movement capability, spacing requirements, and fire-resistance-rating involved for each separate instance.

B. Sealants for use with fire-resistance-rated construction joints, the following products are acceptable:

   1. Hilti CP 672 Speed Spray
   2. Hilti CP 601s Elastomeric Firestop Sealant
   3. Hilti CP 606 Flexible Firestop Sealant
   4. Hilti CP 604 Self-leveling Firestop Sealant

C. Sealants for use as part of a Perimeter Fire Barrier System between fire-resistance-rated floors and exterior wall assemblies, the following products are acceptable:

   1. Hilti CP 672 Speed Spray
2. Hilti CP 604 Self-leveling Firestop Sealant

D. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal deck profile; use as a backer for spray material.

1. Hilti CP 777 Speed Plugs
2. Hilti CP 767 Speed Strips

E. Provide a firestop system with an Assembly Rating as determined by ASTM E 1966 and/or ANSI/UL 2079 which is equal to the fire-resistance ratings of the construction in which the joint occurs.

F. Metal Deck Flutes perpendicular to Wall.

1. 3M™ FireDam Spray 200.

END OF SECTION 07 84 46
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes sealants for the following applications:

1. Exterior joints in the following vertical surfaces and non-traffic horizontal surfaces:
   a. Control and expansion joints in cast-in-place concrete.
   b. Control and expansion joints in unit masonry and manufactured masonry veneer.
   c. Joints between tilt-up concrete panels.
   d. Joints between different materials listed above.
   e. Perimeter joints between materials listed above and frames of doors and windows.
   f. Control and expansion joints in ceiling and overhead surfaces.
   g. Other joints as indicated.

2. Exterior joints in the following horizontal traffic surfaces:
   a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
   b. Joints between different materials listed above.
   c. Other joints as indicated.

3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints of exterior openings where indicated.
   c. Tile control and expansion joints.
   d. Vertical control joints on exposed surfaces of interior unit masonry.
   e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
   f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   g. Other joints as indicated.

4. Interior joints in the following horizontal traffic surfaces:
   a. Control and expansion joints in cast-in-place concrete slabs.
   b. Control and expansion joints in tile flooring.
   c. Other joints as indicated.
B. Related Sections include the following:
   1. Section 09 91 13 “Exterior Painting” for painting of joint sealants.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

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

B. Samples for Initial Selection: Manufacturer’s color charts and fan deck from selected paint manufacturer.

   1. Color as selected by Architect.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Pre-construction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on pre-construction testing specified in "Quality Assurance" Article.

E. Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.

F. Warranties: Special warranties specified in Section 1.8.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance for a minimum of 5-years.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Pre-construction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants as directed by Architect.
1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain joint sealant manufacturer’s written instructions for corrective measures, including the use of specially formulated primers.

5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted. In this case jobsite testing should still be completed to verify adhesion.

D. Pre-construction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.

2. Conduct field tests for each application indicated below:
   a. Each type of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.

4. Test Method: Test joint sealants by hand-pull method described below:
   a. Install joint sealants in 60-inch- (1500-mm-) long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
   b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches (50 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch (25 mm) from cross-cut end of 2-inch (50-mm) piece.
   c. Use fingers to grasp 2-inch (50-mm) piece of sealant between cross-cut end and 1-inch (25-mm) mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
   d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.

5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Pre-construction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

E. Mockups: Before installing joint sealants, apply sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Mock-ups in joints are not necessary for color if cured piece can be obtained.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturers written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

   1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
   2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C).
   3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer’s Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five (5) years from date of Substantial Completion.

C. Special Manufacturer’s Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period. This does not apply to labor involved in completing repairs. See manufacturers warranty language for details.

1. Warranty Period: Minimum of five (5) years required in warranty and terms and conditions of warranty to apply to specific project, except provide a ten (10) year warranty for the following:
   
a. Low-Modulus Neutral-Curing Silicone Sealant.
b. Medium-Modulus Neutral-Curing Silicone Sealant.

D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer’s written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from joint sealant manufacturer’s full range of colors.

1. Architect may have the option of choosing up to six different colors from paint manufacturer selected by the painter.
   
a. Color to match adjacent surface.
2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 or ASTM C 510 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.


E. VOC Compliant, Air Quality Compliant.

2.4 PREFORMED JOINT SEALANTS

A. Preformed Polyurethane Sealant System: For each product of this description indicated in the Preformed Joint-Sealant Schedule at the end of Part 3, provide manufacturer’s standard system consisting of pre-cured extrusion, in sizes to fit joint widths indicated, combined with a sealant for bonding extrusions to substrates.

2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.
2. Type O: Open-cell material.
3. Or any of the preceding types as approved in writing by joint sealant manufacturer for joint application indicated.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

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

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 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 all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
   a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on pre-construction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer’s written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer’s written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type 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.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, install side by side, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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

E. Install sealants by proven techniques to 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 provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.

4. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.
   a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

G. See manufacturers recommended practice for installation or preformed elastomeric sealants.

H. Color of Joint Sealant: If the joint sealants are applied after the painter, then the joint sealant sub is responsible to match the paint color.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as follows when project is subject to manufacturers warranty:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:
   a. To be representative of job size.

2. Test Method: Test joint sealants by hand-pull method described below:
   a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches (50 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch (25 mm) from cross-cut end of 2-inch (50-mm) piece.
   b. Use fingers to grasp 2-inch (50-mm) piece of sealant between cross-cut end and 1-inch (25-mm) mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
   c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

4. Inspect tested joints and report on the following:
   a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer’s field-adhesion hand-pull test criteria.
   b. Whether sealants filled joint cavities and are free from voids.
c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

B. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.7 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Joint sealant with silicone will not be used on a paintable surface.

B. Low-Modulus Neutral-Curing Silicone Sealant

1. Products:

   a. Dow Corning 790 or approved equal (GE SCS-2000, Percora 89, Sonneborn Sonolastic 150 with VLM).

2. Type and Grade: S (single component) and NS (non-sag).

3. Class: good for class 25, 50 and 100/50.

4. Use Related to Exposure: NT (non-traffic).
5. Uses Related to Joint Substrates: M, G, A, and, O.
7. Applications: Exterior joints in vertical and horizontal surfaces, including EIFS joints.

C. Medium-Modulus Neutral-Curing Silicone Sealant:

1. Products:
   a. Dow Corning 795 or approved equal (GE SCS-200 or GE Silpruf, Percora 864, Sonneborn Sonolastic 150 with VLM).

2. Type and Grade: S (single component) and NS (non-sag).
3. Class: good for class 25 and class 50.
4. Use Related to Exposure: NT (non-traffic).
5. Uses Related to Joint Substrates: M, G, A, O.

D. Multi-component Non-sag Urethane Sealant:

1. Products:
   a. Sikaflex - 2c NS; Sika Corporation or approved equal (Sonneborn NP-2, Tremco 240, Pecora Dynatrol 2)

2. Type and Grade: M (multi-component) and NS (non-sag).
4. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.
5. Use Related to Exposure: NT (non-traffic) and T (Traffic).
7. Applications: Exterior and interior joints and gaps in vertical and horizontal surfaces. Submerged or immersion grade applications also apply.

E. Multi-component Non-sag Urethane Sealant – Traffic grade and Tamper resistant:

1. Products:
   a. Sikaflex 2c NS TG, Sika Corporation (Percora Urexpam NR-200)

2. Type and Grade: M (multi-component) and NS (non-sag).
4. Use Related to Exposure: Traffic grade and tamper resistant.
5. Uses Related to Joint Substrates: M, G, A, and, O.
6. Applications: Vertical and horizontal interior and exterior joints and gaps subject to traffic and/or requiring tamper resistant properties.

F. Multi-component Pourable Urethane Sealant:

1. Products:
   a. Sikaflex - 2c SL; Sika Corporation or approved equal (Sonneborn SL-2, Pecora Dynatrol-2 SG, Tremco THC-900, 901)

2. Type and Grade: M (multi-component) and P (pourable).
3. Class: 25
4. Use Related to Exposure: Traffic and non-Traffic
6. Applications: Exterior and interior joints and gaps. Also applies to submerged applications.

G. Single-Component Non-sag Urethane Sealant:

1. Products:
   a. Sikaflex - 1a, Sikaflex-15LM, Sikaflex Textured Sealant, or approved equal (Sonneborn NP-1, Pecora Dynatrol-1, Tremco-921).

2. Type and Grade: S (single component) and NS (non-sag).
3. Class: 25
4. Uses Related to Exposure: Traffic and non-Traffic
5. Uses Related to Joint Substrates: M, G, A, and O.
6. Applications: Vertical and horizontal joints and gaps. Also for submerged applications.

H. Single-Component Pourable Urethane Sealant:

1. Products:
   a. Sikaflex 1CSL, Sika Corporation or approved equal (Sonneborn SL-1, Tremco Vulkem-45, Pecora Urexpand NR-201)

2. Type and Grade: S (single component) and P (pourable).
3. Class: 25
4. Uses Related to Exposure: Traffic and non-Traffic
5. Uses Related to Joint Substrates: M, G, A, and O.
6. Applications: Horizontal interior and exterior joints and gaps.

END OF SECTION 07 92 00
DIVISION 08 - OPENINGS

08 11 13  HOLLOW METAL DOORS AND FRAMES
08 14 16  FLUSH WOOD DOORS
08 31 13  ACCESS DOORS AND FRAMES
08 33 23  OVERHEAD COILING DOORS
08 41 13  ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08 51 13.12  ALUMINUM SLIDING SERVICE WINDOW
08 71 00  DOOR HARDWARE
08 80 00  GLAZING
08 83 00  MIRRORS
SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

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. This Section includes the following:
      1. Standard hollow metal doors and frames.
   B. Related Sections include the following:
      1. Section 08 71 00 "Door Hardware" for door hardware for hollow metal doors.
      2. Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting" for field
         painting hollow metal doors and frames.

1.3 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings.
   B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS
   A. Product Data: For each type of product indicated. Include construction details, material
      descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
   B. Shop Drawings: Include the following:
      1. Elevations of each door design.
      2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
      3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
      4. Locations of reinforcement and preparations for hardware.
      5. Details of each different wall opening condition.
      6. Details of anchorages, joints, field splices, and connections.
      7. Details of accessories.
      8. Details of moldings, removable stops, and glazing.
      9. Details of conduit and preparations for power, signal, and control systems.
C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Other Action Submittals:
   1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

E. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252, UBC Standard 7-2, or UL 10C.

   1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
   2. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

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

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

E. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage.
   1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
1. Note: Spreader bars are for transit only and not to be used as an installation spacer.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Hollow Metal Doors and Frames:
   a. Amweld Building Products, LLC.
   b. Ceco Door Products; an Assa Abloy Group company.
   c. Curries Company; an Assa Abloy Group company.
   d. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

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

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (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.

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

E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

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

G. Glazing: Comply with requirements in Division 08 Section “Glazing.”

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: As indicated
2. Core Construction: Manufacturer’s standard kraft-paper honeycomb, or polystyrene as indicated.
   a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings when indicated.
   b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value U-Factor 0.09, R-Factor 11.1 when tested according to ASTM C236 and SDI 113

   1) Locations: Exterior doors.

3. Vertical Edges for Single-Acting Doors:
   a. Beveled Edges: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Top and Bottom Edges: Closed with flush 0.042-inch- (1.0-mm-) thick, end closures of same material as face sheets.


B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Doors are to be waterproof construction with weep holes in bottom edge. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and...
ANSI/SDI A250.4 for physical performance level. Doors are to be waterproof construction with weep holes in bottom edge.

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) available in 1-3/4-inch (44.5-mm) thickness and have 16 gauge thick galvanized faces.

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

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) available in 1-3/4-inch (44.5-mm) thickness and have 18 gauge thick faces. Width: As indicated on Drawings. Flush door tops are required.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hollow Metal Doors using Recessed Impact Concealed Vertical Rod Exit Devices:

1. Face sheets of hollow metal door preparations shall have radiused corners and an integral flange formed perpendicular to the door face so as to eliminate sharp edges and pinch points.
2. Hollow metal doors shall be reinforced with an 18 gauge section formed to span the entire width and depth of the preparation. Impact device mounting positions shall be reinforced with factory drilled and tapped 8 gauge reinforcements.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.


1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 14 gauge thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Level 2 Steel Doors: 16 gauge thick steel sheet.
6. Frames for Borrowed Lights: Same as adjacent door frame.
D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 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 (50 mm) wide by 10 inches (250 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. Post-installed 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, not less than 0.042 inch (1.0 mm) thick, 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 (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

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

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.
2.8 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- (0.5-mm-) thick, cold-rolled steel sheet set into 0.032-inch- (0.8-mm-) thick steel frame.


2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding.

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

2.10 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 thickness of metal. 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. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors with top caps to prevent water penetration.

2. Glazed Lites: Factory cut openings in doors.

3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.

D. 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. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

4. Floor Anchors: Weld anchors to bottom of jambs and Mullions with at least four spot welds per anchor.

5. Jamb Anchors: Provide number and spacing of anchors as follows:
a. Masonry 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) 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 1 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 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
5) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.

c. 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. Grout frame legs to bond to masonry walls.

6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

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.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section “Door Hardware.”

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8
2. Reinforce doors and frames to receive non templated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

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

2.11 STEEL FINISHES

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

1. Shop Primer: Manufacturer’s standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.


PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

D. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2  PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. 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.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. 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.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3  INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer’s written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-protection-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable glazing stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
4. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch (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.
C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Standard Steel Doors:
      a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
      d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
   3. Smoke-Control Doors: Install doors according to NFPA 105 and UBC Standard 7-2.
D. **Glazing:** Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer’s written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

### 3.4 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 Surfaces:** Clean abraded areas and repair with galvanizing repair paint according to manufacturer’s written instructions.

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END OF SECTION 08 11 13
SECTION 08 14 16 - FLUSH WOOD DOORS

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. This Section includes the following:

1. Solid core doors with wood veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Section 08 11 13 “Hollow Metal Doors and Frames”.
2. Section 08 71 00 “Door Hardware”.
3. Section 08 80 00 “Glazing” for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.
E. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Provide doors meeting or exceeding the minimum standards as set forth by the following organizations unless standards are modified or exceeded by this specification.

1. WDMA IS 1A-Window and Door Manufacturers Association.

B. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing.

D. Provide each fire rated door with a label permanently attached to either the hinge stile or to the top rail, showing testing agency approval for classification scheduled.

E. The top of each door shall bear a label from the manufacturer indicating the door construction, face veneer species, cut and grade. If the doors are factory finished, the label shall also have the finishing information.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer’s written instructions.

B. No doors shall be delivered to the building until weatherproof storage space is available. Store doors in a space having controlled temperature between 60 and 90 degrees and humidity range between 25 and 55 percent. Stack doors flat and off the floor, supported to prevent warping. Protect doors from damage and direct exposure to sunlight.

C. Factory finished doors shall be individually wrapped in polybags to protect the finish from damage by contact with other doors. Properly protect doors.

D. Do not walk or place other material on top of stacked doors. Do not drag doors across one another.

E. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the Contractor at no cost to the Owner.

F. Doors shall be palletized at factory in stack of no more than 30 doors per pallet. Door edges shall be protected with heavy corner guards.
1.6 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with the following requirements applicable to Project’s geographical location:

1. WDMA Section J-1.
2. AWS quality standard Section 2 Care and Storage.

1.7 WARRANTY

A. All work in this Section shall be warranted by a FULL DOOR WARRANTY (from the date of installation) against defect in materials and workmanship, including the following:

1. Delamination in any degree.
2. Warp or twist of 1/4" or more in any 3’6” x 7’0” section of a door.
3. Telegraphing of any part of core assembly through face to cause surface variation of 1/100" or more in a 3” span.
4. Any defect which may, in any way, impair or affect performance of the door for the purpose which it is intended. Replacement under this warranty shall include hanging, installation of hardware, and finishing.

B. Periods of warranty after date of installation:

1. Interior solid core and mineral core - Life of original installation.
2. Exterior solid core - 1 year.

C. Doors must be stored, finished, hung and maintained per manufacturer’s recommendations set forth in their Full Door Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Solid Core Doors:
   a. VT Industries, Inc.
   b. Eggers Industries, Architectural Door Division.
   c. Oshkosh Architectural Door.
   d. Substitutions will not be accepted.
2.2 INTERIOR FLUSH WOOD DOORS

A. Solid Core Doors for Transparent Finish: Comply with the following requirements:

1. Faces: Red Oak, plain sliced.
2. Grade: Premium.
3. Construction: 5 plies.
4. Core: Particleboard core.

B. Fire-Rated Solid Core Doors: Comply with the following requirements:

1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
2. Construction: Manufacturer’s standard core construction as required to provide fire-resistance rating indicated.

2.3 MATERIALS AND COMPONENTS

A. Cores:

1. Particleboard Core: Shall conform to ANSI A208.1 LD-2 32 lb. density core. Stiles shall be 1” minimum structural composite lumber (SCL) veneered over with veneer matching face veneer. Rails will be 1-1/8” minimum structural composite lumber (SCL). Stiles and rails shall be securely bonded to the core then abrasively planed as an assembly before veneering.
2. Mineral Core: Shall be asbestos free, non-combustible mineral composite with a minimum of 28 pounds per cubic foot density when testing in accordance with ASTM C303-82, with 10% maximum absorption by weight with core in equilibrium at 90% relative humidity and 70 degrees Fahrenheit. Stiles and rails shall be manufacturer’s standard for specified label. Stile shall be reinforced to receive full mortise hinges. No salt treated components shall be used.

B. Faces Crossbands: Comply with the following requirements:

1. When veneer for transparent or opaque finish is specified, doors shall be 5 ply, made up of 2 veneers and crossbands, all securely bonded to the core by the hot-press method in one operation, utilizing Type I waterproof adhesive. The cold pressing of 2 or 3 ply door skins to the core will not be accepted. Face veneers shall have a minimum thickness of 1/50 after factory sanding and the individual pieces of veneer forming the face must be edge glued together. Crossbands shall extend the full width of the core assembly.
2. When pairs of doors are scheduled for transparent finish, doors shall be pair matched with a continuous grain pattern.
3. When doors are scheduled with transom panels and transparent finish door, transom shall be matched and produced from a continuous sheet of veneer. Bottom rail of transom panel shall extend full width and be same specie as face except for birch, which may have a maple or beech rail.
4. When plastic laminate is used as a face, laminate shall be 0.050 standard grade to be selected from manufacturers available sources. Laminate shall be bonded to the core with Type I waterproof glue.

   a. Face veneers shall be of specie, cut and grade specified. Quality shall be governed by ANSI/WDMA I.S.1 Series.
   b. Door faces for Transparent Finish:
      1) Veneer “A” Grade.
      2) Veneer Match: Book Match.
      3) Assembly of Veneer on Door Face: Center Balanced Match.
      4) Provide pair matching and set matching for pairs of doors and for doors hung in adjacent sets.
      5) Cross banding shall be thoroughly dried 1/16 thick hardwood or engineered wood product extending full width and height of door with grain at right angles to face.
      6) Face veneer and crossband shall be pressed to the core in a hot-press with Type I waterproof glue.

2.4 LABLELED FLUSH DOORS

A. Stiles: Manufacturers standard for rating listed. Stiles shall be bonded to the core and be salt free. Drill 5/32 pilot holds for all hinge screws at the factory prior to shipment for “B” and “C” label fire doors. Stiles must meet the following performance criteria:

   1. Split Resistance: Average of ten tests samples shall be not less than 800 load pounds when tested in accordance with “Test Method to Determine Split Resistance of Hinge Edges of Composite Type Fire Doors”.
   2. Direct Screw Withdrawal: Average of ten test samples shall be not less than 650 load pounds when tested for direct screw withdrawal in accordance with ASTM D-1037; using a No. 12 x 1-1/4” steel thread-to-the-head wood screw of the cadmium plated or rust-resistant type.
   3. Cycle/Slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of ANSI A151.1, Section 2.5 (Note: Specific data regarding WHI listing features and mechanical test results shall be made available by the manufacturer upon request.)

B. Blocking: All 45, 60, and 90 min. fire doors shall be supplied with salt free non-combustible internal solid blocking. Blocking shall be arranged in the door so that surface mounted hardware such as, but not limited to, closers, exit device, etc., may be secured to the door without a need for through bolts. A lock block, minimum size 5 x 10 shall be supplied for each bored, mortised, or unit lock scheduled.

C. Labeled doors shall be manufactured to the required size so as to provide proper clearances without field trimming. This procedure shall be followed so as to assure the full thickness of the edge bands.
2.5 FABRICATION

A. Fabricate flush wood doors in strict accordance with the referenced standards specified herein.

B. Machining and fitting:

1. All wood doors shall be machined by the manufacturer for cutouts, hinges, locks and all hardware requiring routing and mortising. Any required rabbeting to properly hang doors will be performed by the manufacturer prior to finishing. Doors shall be sized to allow 1/8" clearance at top and each side, and 3/4" bottom (unless specified otherwise.) Factory drilling of pilot holes is not required, except for “B” & “C” label fire doors at mortise hinge locations.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish.

C. Transparent Finish: WDMA system TR6 catalyzed polyurethane finish for open grain finish per section 1500. The sheen shall be satin or semi-gloss. Stain, if required, to be selected from manufacturer’s standard colors or custom matched to Architect’s sample. Top and bottom of the doors to be sealed. Doors to be individually enclosed in a polybag.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installed door frames prior to hanging door:

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."
B. Manufacturer’s Instructions: Install wood doors to comply with manufacturer’s instructions and referenced quality standard and as indicated.

1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch (3.2 mm) at jambs and heads, 1/16 inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) clearance from bottom of door to top of threshold.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
4. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
5. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

3.3 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors that do not swing or operate freely.
B. Finished Doors: Refinish or replace doors damaged during installation.
C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 14 16
SECTION 08 31 13 - ACCESS DOORS AND FRAMES

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. This Section includes the following:
   1. Access doors and frames for ceilings.

B. Related Sections include the following:
   1. Section 08 70 00 "Door Hardware" for mortise or rim cylinder locks and master keying.
   2. Section 09 91 23 "Interior Painting" for painting of access door and frame.

1.3 SUBMITTALS

A. Product Data: For each type of access door and frame indicated. Include construction details,
   fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details of access doors and frames for each
   type of substrate. Include plans, elevations, sections, details, and attachments to other work.

C. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted
   items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers,
   and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a
   single manufacturer.

B. Fire Resistance Ratings: Whenever a fire-rated access panel is indicated, provide complete access
   panel assembly with door, frame, hinge and latch as tested and labeled by U.L. and/or W.H.I.
C. Size Variations: Obtain Architect’s acceptance of manufacturer’s standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in “Submittals” Article.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR CEILINGS


1. Locations: Ceiling surfaces.
2. Door: 16 gauge steel.
3. Frame: 16 gauge steel with 1" flange.
4. Size: 22" x 30".
5. Finish: Phosphate-dipped steel with prime coat.

   a. Paint Color: As selected by Architect.

6. Lock: Keyed into grand master system.
7. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries, Inc., Model TM or comparable product by one of the following:

   a. Acudor Products, Inc.
   b. Babcock-Davis; A Cierra Products Co.
   c. Larsen’s Manufacturing Company.
   d. Milcor Inc.

2.2 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
1. Exposed Flanges: As indicated.
2. Provide mounting holes in frames for attachment of units to metal or wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer’s written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13
SECTION 08 33 23 - OVERHEAD COILING DOORS

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. Section Includes:

1. Insulated Service Doors.

B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports.
2. Section 08 71 00 "Door Hardware" for cylinders.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Wind Load: Exterior overhead coiling doors windloading at 20 psf.

1. Include roller-type wind locks on exterior doors.

C. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer’s product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Show locations of replaceable fusible links.

3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer’s finish charts showing full range of colors and textures available for units with factory-applied finishes.

D. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.

2. Summary of forces and loads on walls and jambs.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653.

B. Door Construction: As specified, by door manufacturer, for each type of door indicated.

2.2 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware." and keyed to building keying system.
2. Keys: Provide Two for each cylinder.

2.3 DOOR ASSEMBLY

A. Service, Insulated Service & Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Cookson Company or comparable product by one of the following:
   b. Overhead Door Corporation.
   c. Raynor.

B. Doors are based on Cookson Company Door Types. Door types as indicated on the drawings.

1. Insulated Service Doors
   a. Manual Operated Insulated Service Door (Type FMWI).
   b. Face of Wall Mounted – Featheredge.
   c. ColorCote Finish: Color as selected by Architect.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
2.5 **DOOR FINISH**

A. The finish on the door curtain shall be Cookson Company Clear Anodized or ColorCote finish consisting of the following:

   2. Bonderized coating for prime coat adhesion.
   3. Factory applied Thermosetting Powder Coating applied with a minimum thickness of 2 mils. The color shall be selected by the Architect and shall be chosen from standard color chart.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 **INSTALLATION**

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer’s written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 **STARTUP SERVICE**

A. Engage a factory-authorized service representative to perform startup service.

   1. Perform installation and startup checks according to manufacturer’s written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.
3.4 **ADJUSTING**

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 **DEMONSTRATION**

A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08 33 23
SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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. This Section includes the following:

1. Exterior storefront framing.
2. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Sections include the following:

1. Section 07 62 00 “Sheet Metal Flashing and Trim”.
2. Section 08 71 00 “Door Hardware” for entrance door hardware sets not under this section.
3. Section 08 80 00 “Glazing” for glazing requirements for aluminum-framed entrances and storefronts.

C. Products installed, but not furnished in this Section include:

1. Flashing specified in Section 07 62 00 “Sheet Metal Flashing and Trim”.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board’s “Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities.”

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
d. Glazing-to-glazing contact.
e. Noise or vibration created by wind and by thermal and structural movements.
f. Loosening or weakening of fasteners, attachments, and other components.
g. Sealant failure.
h. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads:
   a. Basic Wind Speed: 90 mph (40 m/s).
   b. Importance Factor: 1.15.
   c. Exposure Category: C.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

H. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 180 deg F (100 deg C), material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
   b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

3. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

J. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

K. NFRC Certificate: Provide NFRC label certificate in compliance with 2009 IECC.

1.5 SUBMITTALS

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

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

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

D. Samples for Verification: For each type of exposed finish required, in manufacturer’s standard sizes.

E. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

G. Qualification Data: For qualified Installer and testing agency.

H. Preconstruction Test Reports: For sealant.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

J. Source quality-control reports.

K. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer’s standard units in systems similar to those indicated for this Project.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems’ aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
G. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS
A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY
A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals, and metal finishes, and other materials beyond normal weathering.
      d. Adhesive or cohesive sealant failures.
      e. Water leakage through fixed glazing and framing areas.
      f. Failure of operating components.
   2. Warranty Period: Two (2) years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE
A. Entrance Door Hardware:
   1. Initial Maintenance Service: Beginning at Substantial Completion, provide six (6) months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
PART 2 - PRODUCTS

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

2. EFCO (S402 & S403/thermal, Series D518 Durastile Door).

2.2 MATERIALS
A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer’s standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS
A. Framing Members: Manufacturer’s standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

B. Basis-of-Design: Kawneer North America

1. Construction:
   
   b. All other window framing – Kawneer 451T.

2. Glazing System: Retained mechanically with gaskets on four sides.
C. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

E. Concealed Flashing: Manufacturer’s standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer’s standard, recommended by manufacturer for joint type.
   1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section “Glazing.”

B. Glazing Gaskets: Manufacturer’s standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer’s standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer’s standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
   1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
      a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer’s standard glazed entrance doors for manual-swing operation.
1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

2. Door Design: Wide stile; 5-inch (127-mm) nominal width.


2.6 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware as specified in Division 08 Section “Door Hardware”.

B. Provide heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.

1. Thresholds: Provide Pemko 2005AT. Coordinate undercut of door with threshold to provide weathertight seal.

2. Weatherstripping and sweeps at aluminum entry doors (both exterior and interior doors) for watertight seal.

3. Opening-Force Requirements:
   
   a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf ((133 N)) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
   
   b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers’ Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers’ names are abbreviated in "Entrance Door Hardware Sets" Article.

2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Opening-Force Requirements:

1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf (67 N) for not more than 3 seconds.

2. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

E. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

F. Mullions: BHMA A156.3.
1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

G. Weather Stripping: Manufacturer’s standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

H. Weather Sweeps: Manufacturer’s standard exterior-door bottom sweep with concealed fasteners on mounting strip.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Color as selected by Architect to match existing school.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
D. Storefront Framing: Fabricate components for assembly using screw-spline system.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
   1. At exterior doors, provide compression weather stripping at fixed stops.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
   1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
   2. At exterior doors, provide weather sweeps applied to door bottoms.

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer’s written instructions.
   2. Approved equal by one of the following:
      a. EFCO.
      b. Vistawall Architectural Products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer’s written instructions.
   2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

   1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
   2. Alignment:

      a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
      b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

   B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).
3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

END OF SECTION 08 41 13
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 DESCRIPTION OF WORK
A. Work covered by this specification section consists of all labor, materials, and equipment necessary for aluminum sliding service window.

1.3 SUMMARY
A. This Section includes the following:
   1. Aluminum, heavy-duty commercial sliding service window with surface mounted top and bottom track.

B. Related Sections include the following:
   1. Section 09 91 23 “Interior Painting”.

1.4 SUBMITTALS
A. Product data: Submit Manufacturer’s technical product data substantiating that products comply.

B. Shop drawings: Submit for fabrication and installation of windows. Include details, elevations and installation requirement of finish hardware and cleaning.

C. Certification: Provide printed data in sufficient detail to indicate compliance with the Contract Documents.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Delivered windows crated to provide protection during transit and job storage.

B. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect’s specifications and satisfaction, damaged parts should be removed and replaced.
C. Store windows at building site under cover in dry location.

1.6 PROJECT CONDITIONS

A. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.7 WARRANTY

A. All materials and workmanship shall be warranted against defects for a period of one (1) year from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Design is based on aluminum DW3400, deluxe sliding service window as manufactured by C.R. Laurence Co., Inc. (800) 421-6144, or comparable product from the following:

1. Approved equal by Architect prior to bidding.

2.2 MATERIALS

A. Frames: 4" aluminum frame modules shall be constructed of 6063-T5 extruded aluminum. Window glides on top-hung heavy-duty ball bearings slides. Poly-pile weather-stripping and self-latching handle. Overall frame sizes are to be in accordance with the Contract Drawings.

B. Finish: Kynar finish - color per Architect.

C. Glazing: 1/2" tempered glass.

D. Options: Keyed lock, full bottom track (surface mounted). Coordinate with Architect on keying.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install window in accordance with manufacturer’s printed instruction and recommendations.
3.2 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protection of aluminum sliding service window. Remove excess glazing sealant compounds, dirt or other substances.

B. Provide protective measures required throughout the remaining of the construction period to ensure that all the windows do not incur any damage at the time of acceptance.

END OF SECTION 08 51 13.12
SECTION 08 71 00 - DOOR HARDWARE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Hardware for swinging, sliding, and folding doors except special types of unique and non-matching hardware specified in other sections.

1.2 RELATED WORK

A. Section 08 11 13 – Hollow Metal Doors and Frames
B. Section 08 14 16 - Flush Wood Doors
C. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts

1.3 REFERENCES

A. ADA - Americans with Disabilities Act of 1990 including Accessibility Guidelines as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).
C. ANSI/BHMA A156 (.1 through .21)
E. NFPA 80 - Fire Doors and Windows.
G. IBC - International Building Code, as adopted by public Authority Having Jurisdiction (AHJ).
H. State and local Rules and Regulations for Barrier Free Facilities, as adopted by AHJ.

1.4 DOOR HARDWARE TYPES

A. Types of finish hardware required include, but is not necessarily limited to, the following:
   1. Pivot sets and intermediate pivots.
   2. Hinges.
   3. Lock cylinders.
   4. Keys, keying, and key control.
   5. Locksets, latchsets, and privacy sets.
   7. Closers.
   8. Mullions.
   11. Gasketing for exterior and interior doors, as required.
   12. Door holders.
   13. Door bottoms.
   14. Thresholds.
15. Silencers.
B. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of door hardware is indicated elsewhere in this section or in the Door Hardware Schedule at the end of this section. Refer to Part 2 Products for Manufacturer’s identification and allowable substitutions.

1.5 SUBMITTALS

A. Under provisions of Section 01 34 00, submit the following:
   1. Product information: Manufacturer’s published technical product data for all specified door hardware items indicating compliance with the requirements.
   2. Hardware Schedule:
      a. Hardware schedules are intended for the Contractor’s coordination of the work. Review and acceptance by the Architect or Owner does not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.
      b. Submit hardware schedule in the manner and format as specified, complying with the actual construction progress schedule requirements for each draft. Include the following information:
         1) Explanation of all abbreviations, symbols, codes, at the like, including door handing.
         2) Type, style, function, size, and finish of each hardware item.
         3) Door and frame sizes and materials cross referenced to the Architect’s marks in the door schedule.
         4) Room identification (name and number) on each side of door opening as indicated on the drawings.
         5) Product name, model number, description, and name of manufacturer of each item.
         6) Fastenings and other pertinent information.
         7) Locations of hardware cross referenced to architectural floor plans and door schedules.
         8) Mounting heights and locations of each type of hardware.
   3. Key Schedule:
      a. Require qualified representative of the hardware supplier to personally meet with the Owner and obtain the Owner’s written key requirements.
      b. Include a separate key schedule, showing clearly how the Owner’s instructions on keying of locks has been fulfilled.
   4. Samples: Upon request, submit actual material samples of items indicated as for color selection.
   5. Templates: Hardware supplier will furnish hardware templates to the Contractor for each fabricator of doors, frames, and other work to be shop prepared or factory prepared for the installation of hardware. Upon request check shop drawings of such other work, to conform that adequate provisions are made for proper location and installation of hardware.
   6. Provide electrical operation technical sheets including product schematics, point to point diagrams, and electrical requirements of all electrified hardware. Completely coordinate with the general contractor, electrical engineer, electrician, security access subcontractor and the installer. Operational descriptions are for demonstration only – verify operational intent with the owner, architect and electrical engineer.

B. Under provisions of Section 01 70 00, submit the following:
   1. Product information.
   2. Hardware schedule.
   3. Manufacturer’s published operation and maintenance data. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   4. Tools and extra materials as required.
5. Manufacturer’s warranties, revised to meet criteria as established within this section. Warranties shall commence upon acceptance of the building by the owner.
6. Provide physical samples as requested in writing.

1.6 QUALITY ASSURANCE

A. Acceptable Designs:
   1. Items specified in this section are products which are of acceptable design.
   2. Do not substitute other products without Architect’s written prior approval per Section 01600. Requests for approval shall be submitted by factory authorized distributor firms representing the products proposed for substitution.

B. Qualifications:
   1. Manufacturer: Manufacturers named in Part 2 of this section with not less than 5 years experience in manufacturing commercial door hardware of the type indicated.
   2. Hardware Supplier:
      a. A recognized architectural finish hardware supplier who has been furnishing hardware in the same state as the project for a period of not less than 5 years.
      b. Hardware supplier’s organization shall include an experienced Architectural Hardware Consultant (AHC), certified by the Door and Hardware Institute (DHI), who is physically available, at reasonable times during the course of the work, for consultation about project’s hardware requirements, to Owner, Architect and Contractor. Mail or telephone correspondence is not acceptable.
      c. Hardware supplier shall have local warehousing facilities and shall maintain an adequate parts inventory of items supplied for future service to the owner. Supplier will be a factory authorized distributor of all hardware specified.
   3. Installer: Company specializing in installing work of this section with not less than 3 years experience and acceptable to the manufacturer and the hardware supplier. Maintain regular work force of qualified personnel, trained, skilled, and experienced in installing door hardware and constant, competent supervision. The hardware installer shall meet with the representatives of the general contractor and hardware supplier to jointly inventory all hardware items. Upon satisfactory inventory of products, the hardware installer accepts responsibility for all hardware items inventoried.

C. Regulatory Requirements:
   1. Provide hardware for fire rated openings, whether specified or not, in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels. Label hardware, as required, for compliance with pressure testing criteria as dictated in IBC.
   2. Provide hardware which meets or exceeds handicap accessibility per local building code requirements. Conform to the Americans with Disabilities Act (ADA) of 1990 as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).

D. Warranties:
   1. Provide warranty periods that meet or exceed periods noted. Manufacturers that do not meet the required warranty periods shall supply a written statement on the manufacturer’s letterhead that the products will be warranted for the required period. All warranty periods commence upon the date of Owner’s occupancy with no exceptions.
1.7 DELIVERY, STORAGE, HANDLING, AND PROTECTION

A. Deliver, store, handle, and protect products to project site under provisions of Section 01 60 00 and as specified herein.
B. Require hardware supplier to:
   1. Tag each item or package separately, with identification related to final hardware schedule.
   2. Include manufacturer’s basic installation instructions with each item or package.
   3. As material is received by hardware supplier from various manufacturers, sort and repackage in containers with each item clearly marked with appropriate opening numbers to match the approved hardware schedule. Two or more identical items may be packed in the same container.
   4. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
   5. Inventory hardware jointly with representatives of the general contractor, hardware supplier and the hardware installer until each is satisfied that count is correct. Refer to paragraph 1.6-B-3.
C. Protect hardware from theft by cataloging and storing in a secure and lockable area. Control the handling and installation of hardware items which are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses, both before and after installation. Replace lost, missing, damaged, or stolen door hardware items at no additional cost to the Owner as required to meet schedule requirements.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate work of this section with the work of other sections of work.
B. Furnish hardware templates to each fabricator of doors, frames, and other work to be shop or factory prepared for the installation of hardware.
C. Verify completeness and suitability of door hardware with the hardware supplier and the hardware installer.

1.9 MAINTENANCE MATERIALS

A. Furnish to Owner a complete set of special wrenches and tools applicable to each different or special hardware component as needed for Owner’s continued adjustment, maintenance, removal, and replacement of door hardware.
B. Tools and accessories shall be supplied by the hardware component manufacturer.

PART 2 – PRODUCTS

2.1 MATERIALS AND FABRICATION

A. General:
   1. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.
   2. Quantities listed, in any instance, are for the Contractor’s convenience only and are not guaranteed.
   3. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation. Match the quality and finish of items specified.
   4. Provide miscellaneous hardware as listed in hardware groups.
B. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Door schedule indicates
door and frame sizes, materials, required fire ratings, and other pertinent information. Furnish each item
of hardware for proper installation and operation of door movement as indicated.

C. Manufacturer’s Name Plate: Do not use manufacturer’s products which have manufacturer’s name or
trade name displayed in a visible location (omit removable name plates), except in conjunction with
required UL or FM labels and as otherwise acceptable to the Architect. Manufacturer’s identification will be
permitted on rim of lock cylinders and latch faceplates only.

D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer’s
standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially
recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard
for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish
“optional” materials or forming methods for those indicated, except as otherwise specified.

E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for
machine screw installation. Do not provide hardware which has been prepared for self tapping sheet metal
screws, except as specifically indicated.

1. Screws: Furnish screws for installation, with each hardware item. Provide Phillips flat head screws
except as otherwise indicated. Finish exposed (exposed under any condition) screws to match
hardware finish or, if exposed in surfaces of other work, to match finishes of such other work as
closely as possible, including “prepared for paint” in surfaces to receive painted finish.

2. Concealed Fasteners: Provide concealed fasteners for hardware units which are exposed when door is
closed, except to extent no standard units of type specified are available with concealed fasteners. Do
not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work,
except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for
each thru-bolt or use sex screw fasteners.

2.2 Hinges

A. Manufacturer:
1. Listed in Door Hardware Schedule: Stanley
2. Substitutions: Hager, McKinney
3. Continuous hinges are as manufactured by Stanley. Equal products by Hager or Markar are
acceptable.

B. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames,
provide only template produced units.

C. Screws: Furnish Phillips flat head or machine screws for installation of units, except furnish Phillips flat
head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges.

D. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
1. Steel Hinges: Steel pins.
5. Interior doors: Non-rising pins.

E. Pin Tips: Flat button and matching plug, finished to match leaves.

F. Number of Hinges: Provide number of hinges indicated, but not less than 3 hinges per door leaf for doors
90° or less in height and one additional hinge for each 30° of additional height.

G. Butt type hinges are to be warranted for a period of five years.
2.3 LOCK CYLINDERS

A. Manufacturer:
   1. Listed in Door Hardware Schedule: Best
   2. Substitutions: Yale, Corbin

B. Equip locks with standard format cylinders with construction cylinders or construction keying for use during the construction phases. Temporary cylinders shall be removed upon installation of the permanent key system by the owner and returned to the hardware supplier. Factory construction keying shall be the lost ball type that is voided by use of the permanent masterkey.

C. Construct lock cylinder parts from brass/bronze, stainless steel, or nickel silver.

2.4 KEYS, KEYING, AND KEY CONTROL

A. Keys:
   1. Material: Provide keys of nickel silver only.
   2. Quantities: These quantities are to establish a maximum allowable quantity of cut keys to service the project and may not necessarily be assigned as noted. A lesser quantity of cut keys required will not result in any credits, nor a quantity of uncut keys to be issued unless noted otherwise.
      a. 3 change keys per each cylinder unit.
      b. 4 master keys per master.
      c. 20 construction keys.
   3. Deliver keys to the Owner’s representative: Send masterkeys to the Owner via U.S. registered mail direct from hardware supplier or manufacturer.

B. Keying:
   1. Comply with Owner’s written instructions for masterkeying and, except as otherwise indicated, provide individual change keys for each lock which is not designated to be keyed alike with a group of related locks.
   2. Grandmaster key all cylinder items to coordinate with the Owner’s instructions and the existing Yale masterkey system. Allow for expansion. Permanently inscribe each key with the notation “DO NOT DUPLICATE”.

C. Key Control:
   1. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by the system manufacturer, with capacity for 150% of the number of locks required for the project.
   2. Provide a hinged panel type cabinet, for wall mounting, Telkee RWC-75S or equal.
   3. Provide cylinder units with concealed key control and keys with visual key control.

2.5 LOCKSETS, LATCHSETS, AND PRIVACY SETS:

A. Manufacturer:
   1. Listed in Door Hardware Schedule: Stanley QCD1
   2. Substitutions: Yale, Corbin

B. Types: Locksets, latchsets, and privacy sets as indicated in Door Hardware Schedule.

C. Strikes: Provide manufacturer’s standard wrought box strike for each latch or lock bolt. Provide dust-proof strikes for foot bolts, except where not available. At these locations, provide manufacturer’s
standard recessed strike. Provide roller type strikes where recommended by lock, latch or bolt manufacturer.

D. Lock Throw: Provide 3/4" minimum throw of mortise type latches and deadbolts used. Cylindrical latches will be 1/2" minimum. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

E. Locks and latches shall be warranted for a period of five years.

2.6 CLOSERS

A. Manufacturer:
   1. Listed in Door Hardware Schedule: Stanley QDC1
   2. Substitutions: LCN 4041XD, Norton 7500

B. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer’s recommendations for size of door control unit, depending on the size of the door, exposure to weather and anticipated frequency of use.

C. Provide manufacturer’s standard through bolt attachment at all applications.

D. Arms:
   1. Provide parallel arms for all overhead closers, except as otherwise indicated. Provide drop plates as needed to prevent glazing interference.

E. Mount all closers to the maximum allowable degree of opening by the closer manufacturer’s template. Where closer arms incorporate dead stop features, mount closers to the maximum degree of opening available before conflict with adjacent structures. If not apparent on the contract documents, verify the use of open space with the Architect or Owner’s Representative to determine the maximum allowable degree of opening.

F. Access Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force. Fire protection has precedence over handicap compatibility, check with local jurisdiction.

G. Door closers and related hardware shall be warranted for a period of ten years.

2.7 WALL, FLOOR AND OVERHEAD STOPS

A. Manufacturers:
   1. Listed in Door Hardware Schedule: Trimco
   2. Substitutions: Rockwood, Hager
   3. Overhead stops will be as manufactured by ABH. Equal products by Rixson are acceptable.

B. General: Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.

C. Import products lesser in quality than the specified items are not acceptable.

2.8 PROTECTION PLATES

A. Manufacturers:
   1. Listed in Door Hardware Schedule: Trimco
   2. Substitutions: Rockwood, Hager, Tice

B. Types: Armor Plates, Kick Plates, Mop Plates
C. Fasteners: Provide manufacturer’s standard exposed Phillips head fasteners for door trim units; either machine screws or self tapping sheet metal type screws per manufacturer’s recommendations for application to the specified door construction.

D. Sizes: Fabricate protection plates (armor, kick or mop) not more than 2’ less than door width on stop side and not more than 1’ less than door width on pull side, x the height indicated.

F. Metal Plates: Stainless Steel, 18 gauge (0.050) thick. Satin finish, US32D (630), beveled four edges (B4E).

2.9 GASKETS AND SWEEPS

A. Manufacturer:
   1. Listed in Door Hardware Schedule: Pemko
   2. Substitutions: National Guard, Reese

B. General: Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide type, sizes and profiles indicated as drawn or scheduled.

C. Fasteners: Provide non-corrosive fasteners as recommended by the manufacturer for applications indicated.

D. Replaceable seal strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by the manufacturer.

E. Perimeter weatherstripping: Flexible, hollow neoprene bulb or loop insert, conforming to MIL R 6055, Class II, Grade 40. Where two types of perimeter gaskets are specified, apply them not to conflict and per gasket manufacturer’s recommendations.

F. Weatherstripping at Door Bottoms: Provide door bottoms consisting of contact type resilient insert and metal housing of design and size indicated.

G. Hot smoke seal, if required by IBC and subsequent UL testing procedures, will be supplied as an integral part of the door assembly by the door manufacturer.

H. Gaskets and sweeps shall be warranted for a period of three years.

2.10 THRESHOLDS

A. Manufacturer:
   1. Listed in Door Hardware Schedule: Pemko
   2. Substitutions: National Guard, Reese

B. Except as otherwise indicated provide standard metal threshold unit of type, size and profile as detailed or scheduled. All thresholds will be supplied with the Pemkote abrasive finish unless noted otherwise.

C. Where there is conflict between scheduled thresholds and details, details shall have precedence. Revise details only if necessary to comply with handicap accessibility requirements. Notify the Architect of such required modifications.

D. Verify threshold details or conditions at all openings to ensure that the openings receive proper applications for weather seal or floor transition whether specified or not.

E. Thresholds and related items shall be warranted for a period of three years, abrasive coatings shall be warranted for a period of ten years.

2.12 SILENCERS

A. Manufacturers:
   1. Listed in Door Hardware Schedule: Trimco
2. Substitutions: Rockwood, Ives

2.13 FINISHES

A. Exposed surfaces of hardware shall be Polished Chrome (US26, 625, 651), unless otherwise indicated. Items specified in Polished Stainless Steel (US32, 629) shall be supplied in stainless steel with no exceptions.
B. The designations used in the schedule and elsewhere to indicate hardware finishes are the industry recognized standard commercial finishes common to the product’s manufacturer listed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine and verify that substrates and project site conditions are ready to receive work of this section.
B. Do not begin installation until finishes indicated to be field applied have been applied to doors, frames, and similar items requiring project site finishing and are thoroughly dry and cured.
C. Do not begin installation until unsatisfactory conditions are corrected in a manner acceptable to the installer. Beginning installation means installer accepts project site conditions and substrates as ready to receive work of this section.

3.2 INSTALLATION

A. General: The types and approximate quantities of door hardware required for this project are indicated at the end of this section.
B. Key Cabinet: Installation will be done by the owner.
C. Heights: Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Architect.
D. Substrates: Adjust and reinforce attachment substrates as necessary for proper installation and operation of hardware.
E. Installation:
   1. Install each hardware item in compliance with the manufacturer’s instructions, as adopted by local jurisdiction, requirements of NFPA 80, NFPA 101, IBC, ADA, State and local Rules and Regulations for Barrier Free Facilities and recommendations of the DHI.
   2. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
   3. Drill and countersink units which are not factory prepared for fasteners. Space fasteners and anchors in accordance with industry standards.
   4. Where not factory machined, machine cut for hardware per template, as required.
   5. Cut and fit thresholds and floor covers to profile of door frames. Join units with concealed welds. Cut smooth openings for spindles, bolts, or similar items. Screw thresholds to substrate with the manufacturer’s standard flat head sleeve anchor (FHSL), 1/4-20 x 2” unless noted otherwise. Fill cavities of thresholds at sound rated openings with 1 inch thick (uncompressed thickness) low density fiberglass sill sealer insulation full width and length of the threshold. In addition to fastening
requirements, set thresholds for exterior doors in a full bed of butyl-rubber or polyisobutylene mastic sealant.

6. Do not install hardware which is incomplete or apparently improper for application. Notify the hardware supplier immediately of any such deficiencies. Failure to comply with this requirement indicates the hardware installer’s acceptance of responsibility for proper application and performance.

F. Cutting and Patching:
Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections.

G. Where electronics are specified for integration with the security access system, operation notes are for opening options that may or may not be utilized by the owner. Consult with the owner and security access subcontractor for final operation parameters.

3.3 ADJUSTING

A. Initial Adjustment:
1. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Adjust resilient faced sound stops for continuous contact with door and threshold. Adjust weatherstripping and sweeps to completely seal doors with frames and to adjacent structures.
2. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.4 DEMONSTRATION

A. Instruct Owner’s personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.5 CLEANING AND DEBRIS

A. Cleaning:
1. Clean work upon installation.
2. Clean adjacent surfaces soiled by work of this section.

B. Debris: Remove debris from project site and legally dispose of off-site.

3.6 MAINTENANCE

A. Approximately six months after the acceptance of hardware in each area, the hardware installer shall:
1. Return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.
2. Consult with and instruct Owner’s personnel in recommended additions to the maintenance procedures.
3. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units.
4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware and submit to the Architect.

3.7 PROTECTION

A. Protect work of this section as required so that work will be without damage or deterioration at the time of completion and acceptance by the Owner.

3.8 DOOR HARDWARE SCHEDULE

Manufacturer’s Abbreviations

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AB ABH</td>
<td>Overhead Stops</td>
<td></td>
</tr>
<tr>
<td>AD Adams Rite</td>
<td>3-Point Locking System</td>
<td></td>
</tr>
<tr>
<td>BE Best Access Systems</td>
<td>Cylinders</td>
<td></td>
</tr>
<tr>
<td>IL ILCO</td>
<td>ADA Thumbturn Cylinders</td>
<td></td>
</tr>
<tr>
<td>PE Pemko</td>
<td>Gaskets, Weatherstrip, Thresholds</td>
<td></td>
</tr>
<tr>
<td>ST Stanley Commercial</td>
<td>Closers, Hinges, Automatic Operators,</td>
<td></td>
</tr>
<tr>
<td>TK Telkee</td>
<td>Key Cabinet</td>
<td></td>
</tr>
<tr>
<td>TR Trimco</td>
<td>Stops, Latch Guards, Flat Goods</td>
<td></td>
</tr>
<tr>
<td>YA Yale</td>
<td>Cylinders</td>
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Miscellaneous Hardware – supply the following:

**SET #1**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Abbreviation</th>
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<tr>
<td>2 Door Closers</td>
<td></td>
<td>QDC111 Tri-packed</td>
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<td>689 ST</td>
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<tr>
<td>1 Key Cabinet</td>
<td></td>
<td>AWC-150S</td>
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<td>TK</td>
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<td>2 Continuous Hinge</td>
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<td>628 ST</td>
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<td>2 Push/Pull Set</td>
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<td>1738 Type L &amp; N Mounting</td>
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<td>630 TR</td>
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<tr>
<td>1 3-Point Deadlock</td>
<td></td>
<td>MS1850S x 4015 x 4085</td>
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<td>628 AD</td>
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<tr>
<td>1 ADA Compliant Thumbturn</td>
<td></td>
<td>ADA7181TK1</td>
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<td>626 IL</td>
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<tr>
<td>1 Mortise Cylinder</td>
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<td>1E-74 STD</td>
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<td>626 BE</td>
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<td>2 Door Closer</td>
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<td>QDC115 x 8Q00471</td>
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<tr>
<td>1 Decal</td>
<td></td>
<td>773</td>
<td></td>
<td>TR</td>
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<tr>
<td>1 Threshold</td>
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<td>172 A FHSL14SS</td>
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Perimeter and meeting stile gaskets by door manufacturer. Verify threshold conditions per 2.11-C

**SET #2**

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<th>Item</th>
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<td>1 Cylinder</td>
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<td>1E-74 or 12E74 as required</td>
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Balance by door manufacturer.
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<th>SET #3</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td>3 Hinges</td>
<td>FBB191 4 1/2 X 4 1/2 NRP</td>
<td>630</td>
<td>ST</td>
<td></td>
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<tr>
<td>1 Lockset</td>
<td>QCL151 M BF</td>
<td>626</td>
<td>ST</td>
<td></td>
</tr>
<tr>
<td>1 Door Closer</td>
<td>QDC111</td>
<td>689</td>
<td>ST</td>
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END OF SECTION 08 71 00
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. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior borrowed lites.
4. Spandrel glass.
5. One-way glass.
7. Glass panels in stair railings.

B. Related Sections include the following:

1. Section 05 51 13 "Metal Pan Stairs" for glass clamps and stairs associated with glass.
2. Section 08 11 13 "Hollow Metal Doors and Frames".
3. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts".
4. Section 08 83 00 "Mirrors".

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer’s written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer’s written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer’s written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

   b. Specified Design Wind Loads: Not less than wind loads applicable to Project as required by ASCE 7 “Minimum Design Loads for Buildings and Other Structures”: Section 6.0 “Wind Loads.”
   c. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, “Minimum Design Loads for Buildings and Other Structures”: Section 6.5, “Method 2-Analytical Procedure,” based on mean roof heights above grade indicated on Drawings.

      1) Basic Wind Speed: 90 mph.
      2) Exposure Category: C.
      3) Importance Factor: 1.15

   d. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

      1) Load Duration: 3 seconds.
C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer’s published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
   a. U-Factors: 0.29, maximum.
   b. Solar Heat Gain Coefficient: 0.27, maximum.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Product Test Listings: From a qualified testing agency indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

C. Samples: For the following products, in the form of 12-inch square Samples for glass.

1. Insulating glass for each designation indicated.
2. For each color (except black) of exposed glazing sealant indicated.
3. Ceramic-coated spandrel glass.

D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, laminated glass and insulating glass.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201. No wire glass allowed.
   1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the manufacturer acceptable to authorities having jurisdiction.
   2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA’s “Glazing Manual.”

F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
   1. Insulating Glass Certification Council.
   2. Associated Laboratories, Inc.

G. NFRC Certificate: Provide NFRC label certificate in compliance with 2009 IECC.

H. Fire-Rated Glass: Each lite shall be labeled with a permanent logo including the name of product, manufacturer, testing laboratory (Intertek Testing Services (Warnock-Hersey) or Underwriters Laboratories), fire rating period and safety glazing standards.
I. Fire-Rating Testing: Fire-rating tested and listed by Intertek Testing Services (Warnock-Hersey) or Underwriters Laboratories; tested in accordance with UBC Standard 7-2, UBC Standard 7-4, UL 9, UL 10c, NFPA 252, NFPA 257, ASTM E 2010, and ASTM 2074.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer’s written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer’s written recommendations for venting and sealing to avoid hermetic seal ruptures.

C. Maintain minimum and maximum temperature limits as recommended by manufacturers.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

A. Manufacturer’s Special Warranty for Coated-Glass: Manufacturer’s standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in “Definitions” Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of manufacture.

B. Manufacturer’s Special Warranty on Laminated Glass: Manufacturer’s standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in “Definitions” Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

C. Manufacturer’s Special Warranty on Insulating Glass: Manufacturer’s standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in “Definitions” Article, f.o.b. factory.

1. Warranty Period: 10 years from date of manufacturer.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 “Performance Requirements” Article.

3. For uncoated glass, comply with requirements for Condition A.

4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Laminated Glass: ASTM C1172, and complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

   a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.

2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.

D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E774 for Class CBA units and with requirements specified in this Article and in Part 2 “Insulating-Glass Units” Article.

1. Fabrication Process: All insulating glass shall be manufactured on a vertical insulating glass production line.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 “Performance Requirements” Article.

3. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.

4. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit’s edge.

5. Sealing System: Dual seal, with primary and secondary sealants as follows:
   a. Polyisobutylene and silicone.

6. Spacer Specifications: Manufacturer’s standard spacer material and construction complying with the following requirements:
   a. Spacer Material: Aluminum with mill or clear anodic finish.
   b. Desiccant: Molecular sieve or silica gel, or blend of both.
   c. Corner Construction: Manufacturer’s standard corner construction.

E. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B (spandrel glass, one surface ceramic coated), Type I (transparent flat glass), Quality-Q3, and complying with other requirements specified.

2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers’ written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer’s full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral-Curing Silicone Glazing Sealants GS:
   a. Products:
2.4 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.5 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements. All insulating glass shall be manufactured on a vertical insulating glass production line.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

2.6 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass: Class 1 (clear) annealed or Kind HS (heat-strengthened) float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements. Kind HS (heat-strengthened) float glass. Kind FT (fully tempered) float glass.
1. Thickness: 6.0 mm.

2.7 INSULATING-GLASS UNITS

A. Solar-Control Low-E Insulating-Glass Units IG:

1. Basis-of-Design Product: Solarban 70XL or a comparable product by one of the following:
   a. PPG Industries.
   b. AGC Flat Glass – Ti-AC 28
   c. Guardian Industries Corp.
   d. Approved prior to bidding.

2. Products:
   a. Clear Solarban 70XL (2).

3. Overall Unit Thickness and Thickness of Each Lite: 1”, 1/4”.
4. Interspace Content: Air.
5. Outdoor Lite: Class 1 (clear) float glass, low e coated.
   a. Solarban 70XL.
   b. Tempered as required by Safety Glazing codes.

6. Indoor Lite: Class 1 (clear) float glass.
   a. Clear Annealed.

7. Low-E Coating: Sputtered on second PPG Solarban 70 (2).
8. Visible Light Transmittance: 64%
9. Winter Nighttime U-Factor: 0.28
10. Summer Daytime U-Factor: 0.26
11. Solar Heat Gain Coefficient: 0.27
12. Outdoor Visible Reflectance: 12%

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00
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. This Section includes the following types of silvered flat glass mirrors.
      1. Annealed monolithic glass mirrors.
   B. Related Sections include the following:
      1. Section 08 80 00 “Glazing” for glass with reflective coatings used for vision and spandrel lites.
      2. Section 10 28 00 “Toilet and Bath Accessories” for metal-framed mirrors.

1.3 DEFINITIONS
   A. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer’s written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.4 PERFORMANCE REQUIREMENTS
   A. Provide mirrors that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.5 SUBMITTALS
   A. Product Data: For the following:
      1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
      2. Mirror mastic.
      3. Mirror hardware.
B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples: For each type of mirror product required, in the form indicated below:
   1. Mirrors: 12” x 12”.
   2. Mirror trim: 12 inches (300 mm) long, (J-Channel).

D. Product Certificates: For each type of mirror, signed by product manufacturer.

E. Mirror Mastic Compatibility Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing paint and substrates on which mirrors are installed.

F. Warranty: Five (5) years.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirror glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirror installations with a record of successful in-service performance.

B. Source Limitations for Mirrors: Obtain mirrors from one source for each type of mirror indicated.

C. Source Limitations for Mirror Glazing Accessories: Obtain mirror glazing accessories from one source for each type of accessory indicated.

D. Glazing Publications: Comply with the following published recommendations:
   1. GANA Mirror Division’s "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

E. Safety Glazing Products: For laminated mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

F. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing paint and substrates on which mirrors are installed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer’s written instructions and as needed to prevent damage to mirrors from condensation, temperature changes, direct exposure to sun, or other causes.
B. Comply with mirror manufacturer’s written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.9 WARRANTY

A. Special Warranty: Manufacturer’s standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate as defined in “Definitions” Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below:

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Arch Aluminum & Glass Co., Inc.
2. Gardner Glass Products.
3. Guardian Industries Corp.
4. Independent Mirror Industries, Inc.
5. Northwestern Industries, Inc.

2.2 SILVERED FLAT GLASS MIRROR MATERIALS


1. Nominal Thickness: 6.0 mm.

B. Annealed Float Glass for Inner Lite of Laminated Mirrors: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).

C. Laminated Mirror consisting of 6 mm clear mirror, .030PVB 3 mm clear glass.
2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.

B. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Gunther Mirror Mastics.
      b. Palmer Products Corporation.

2. VOC Content: Not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MIRROR HARDWARE

A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

   1. Bottom Trim: J-channels formed with front leg and back leg not less than 7/8” in height, respectively, and a thickness of not less than 0.04”.
   2. Top Trim: J-channels formed with front leg and back leg not less than 5/8” in height, respectively, and a thickness of not less than 0.04”.
   3. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Bottom Trim:
         2) Sommer & Maca Industries, Inc.; Medium Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.
         3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.

      b. Top Trim:
         2) Sommer & Maca Industries, Inc.; Medium Gauge Aluminum Deep Nose "J" Moulding Upper Bar.
         3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.
B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes as indicated on drawings.

B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished edge. (Drama Dressing Rooms - provide metal trim.)

D. Laminated Safety Mirrors: Provide laminated mirrors fabricated to produce units complying with ASTM C 1172, Kind LM, and the following:

1. Glass Lites: Inner lite of mirror glass with silver coating on third surface and outer lite of clear float glass.
2. Interlayer Material: Mirror manufacturer's standard 0.030-inch thick, polyvinyl-butylal interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.
3. Laminating Process: Laminate glass using laminator's standard heat-plus-pressure process to produce glass free from foreign substances, air or glass pockets, and other defects.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
2. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer’s written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer’s special bond coating where applicable.
3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer’s written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
   1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
   2. For mirror hardware in the form of continuous J-channels at bottom, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, 2 slotted weeps not less than 1/4 inch wide by 3/8 inch long.
   3. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
   4. For metal or plastic clips, place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges.
   5. Where indicated, install mirror hardware in the form of J-channels that are fabricated in single lengths to fit and cover top and bottom edges of mirrors.
   6. Install mastic as follows:
      a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
      b. Apply mastic to comply with mastic manufacturer’s written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
      c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

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SECTION 09 21 16 — GYPSUM BOARD ASSEMBLIES

PART 1 — GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.
B. Delegated Design Metal framing for interior partitions, ceilings and soffits.
C. Resilient sound isolation components.
D. Shaft wall system.
E. Gypsum sheathing.
F. Cementitious backing board.
G. Gypsum wallboard.
H. Joint treatment and accessories.

1.2 DEFINITIONS

A. Interior Wet Areas: Toilet room, bath room, shower, janitor closet, laundry room, walls within indicated distance behind or adjacent to a sink, trash room, and recycle room.
B. Exterior Wet Areas: see construction assemblies on drawings for diagrams indicating distances.
C. Steel Thickness: Minimum base metal thickness per SSMA.

1.3 SYSTEM DESCRIPTION

A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: STC of value indicated in Drawings calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.
B. Shaft Wall: Configure and install components as required to achieve the following performance levels:
   1. Air Pressure Within Shaft: Intermittent loads of 10 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 40-44 calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
C. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer’s data on partition head to structure connectors, showing compliance with requirements.

E. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.5 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 754, ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies. Comply with more stringent recommendations of Northwest Wall and Ceiling Bureau (NWCB).
   1. Maintain one copy of standards at project site.

C. Provide acoustically rated assemblies in compliance with listings for ratings indicated.

D. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

B. Brace and restrain ceilings as required by building code and AHJ.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories: Member of SSMA or GA.
   8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Interior Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf, except L/360 at 5 psf for ceramic tile and L/720 at 5 psf for stone tile or stone veneer.
   1. Studs: “C” shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Furring: Hat-shaped sections, minimum depth of 7/8 inch or as indicated.
   4. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
      a. Manufacturers - Resilient Furring Channels:
         1) Same manufacturer as other framing materials.
   5. Resilient Channel: Assymetric-shaped channel with face connected to single flange by single leg with alternating slots, 1/2 inch deep.

C. Exterior Loadbearing Studs for Application of Gypsum Board: As specified in Section 054000.

D. Shaft Wall Studs and Accessories: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
   1. Manufacturers - Shaft Wall Studs and Accessories:
      a. Same manufacturer as other framing materials.

D. Shaft Wall Studs and Accessories: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 and specified performance requirements.

F. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and screwed to secondary deflection channel set inside but unattached to top track.
2.3 RESILIENT SOUND ISOLATION COMPONENTS

A. Resilient Z-Furring: 1/2 inch depth, for attachment to substrate through one leg only.
   1. Manufacturer: Sams as other light gauge metal framing.

B. Mechanical Fasteners: As required by manufacturer.

C. Acoustic Sealant: As specified in Section 07 92 19.
   1. Alternate to Acoustic Sealant: Acoustic Isolation Fabric; Space Assurance, flame resistant polyester fabric for isolation of ceiling and wall gypsum board intersections
      a. Manufacturer: Keene Building Products, 5910 Landerbrook Drive, Suite 210, Mayfield Heights, OH; keenebuilding.com

2.4 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels conforming to ASTM C1396/C1396M; sizes to minimize joints in place; ends tapered.
   1. Fire Resistant Type: Complying with "Type X" requirements; UL or WH rated.
      a. At assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
      b. Application: Vertical surfaces, unless otherwise indicated.
      c. Thickness: 5/8 inch.
      d. Edges: Tapered.
   2. Special Fire Resistant Type: "Type C"; meeting and exceeding requirements of Type X; UL or WH rated.
      a. Application: Where required for fire-rated assemblies, unless otherwise indicated.
      b. Edges: Tapered.
   3. Ceiling Board: Special sag-resistant type.
      a. Application: All ceilings, unless otherwise indicated.
      b. Thickness: 5/8 inch.
      c. Edges: Tapered.

C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C1396M; ends tapered.
   1. Application: Vertical surfaces behind thinset tile and in wet areas.
2. Core Type: Regular, Type X, and Type C as indicated.

D. Glass Matt Faced Board: ASTM C1658/C1658M, suitable for paint finish, moisture resistant type; sizes to minimize joints in place; water repellent paper faces; ends square cut.
   1. Application: Exterior sheathing and board that is installed in areas that are exposed to the weather during construction.

E. Sheathing: Glass mat faced gypsum, ASTM C 1177C/1177M, Type X fire-resistant core, long edges.
   1. Fire Resistance:
      a. Dens-Glass Gold Fireguard: One hour rated systems when tested in accordance with ASTM E 119, UL Classified.
      b. If roofing manufacturer will not warrant the roof system with Dens-Glass Gold, provide manufacturer’s approved sheathing where interfacing with roofing system.
      c. Sheathing must also be rated to conform to roofing installation requirements including roofing temperature required for hot application roofing.
   2. Thickness: 5/8 inch for rated assemblies.
   3. Edges: Square.

F. Shaftwall and Coreboard: Regular, Type X, and Type C as indicated; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
   1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C 1396/C 1396M; water-resistant faces.
   2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C 1658/C 1658M.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D 3273.
   4. Products:
      a. Georgia-Pacific Gypsum LLC; DensGlass Ultra Shaftliner (mold-resistant).
      b. National Gypsum Company; Gold Bond Brand 1’ Fire-Shield Shaftliner XP (mold-resistant).
      c. USG Corporation; Sheetrock Gypsum Liner Panels—Enhanced (mold-resistant).
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 21 00.

B. Acoustic Sealant: As specified in Section 07 92 19.
   1. Product: QuietZone Acoustic Sealant manufactured by Owens Corning.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.

D. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   3. Chemical hardening type compound at wet areas.

D. PVA Drywall Sealer and Primer: See Section 09 90 00.

E. Screws for Attachment to Steel Members Less Than 0.03 inch in Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.

F. Screws for Attachment to Steel Members From 0.033 to 0.112 Inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

G. Screws: ASTM C 1002; self-piercing tapping type, anticorrosive-coated at wet areas.

H. Screws: ASTM C 954; steel drill screws for application of gypsum board to 40 mil and greater steel studs, anticorrosive-coated.

I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

J. Adhesive for Attachment to Wood: ASTM C557

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer’s installation instructions.
   1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
   2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
2. Seal perimeter of shaft wall and penetrations with fire stopping and acoustical sealant appropriate for UL listing.
3. Provide deflection head product or detail for 3/4 inch deflection, unless indicated otherwise.

3.3 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer’s instructions.

B. Studs: Space studs at 16 inches on center, unless indicated otherwise.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer’s instructions.
   3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
   4. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer’s instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
   5. Provide not less than 43 mil thick studs supporting wall cabinets and similar high wall loads. Refer to casework specification for design load.
   6. Provide not less than 54 mil thick studs supporting plumbing fixtures, counter tops and similar low wall-hanging loads. In addition to dead load, support 300 pound live load located anywhere on supported item.

B. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double 33 mil studs at jambs.

D. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Horizontal.
   2. Spacing: As indicated.

E. Acoustic Furring: Install resilient channels at maximum 24 inches on center, unless indicated otherwise.
   1. Locate joints over framing members.
   2. Orient open leg facing up to receive gypsum board.

E. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

G. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
3. Plumbing fixtures.
4. Toilet accessories.
5. Wall mounted door hardware.

H. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, wood frame openings, toilet accessories, hardware, and other items as indicated. Comply with Section 06 10 00 for wood blocking with kerf for flange return.
1. Metal Blocking (where approved): Continuous 6 inch 43 mil track with legs cut at supports.

3.4 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer’s instructions.
1. Place one bead continuously on substrate before installation of perimeter framing members.
2. Place continuous bead at perimeter of each layer of gypsum board.
3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.5 BOARD AND GLASS MAT FACED BOARD INSTALLATION

A. Comply with most stringent of NWCB, ASTM C 840, GA-216, and manufacturer’s instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board parallel to framing, with ends and edges occurring over firm bearing.
1. Exception: Tapered edges to receive joint treatment at right angles to framing.

B. Double-Layer Non-Rated: Use gypsum board for first layer, placed perpendicular to framing or furring members, with ends and edges occurring over firm bearing. Place second layer parallel to framing or furring members. Offset joints of second layer from joints of first layer.

C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.

F. Exterior Soffit Board: Install perpendicular to framing, with staggered end joints over framing members or other solid backing.

G. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer’s instructions.
H. Glass Mat Faced Gypsum Board: Install in strict accordance with manufacturer’s instructions.

I. Installation on Metal Framing: Use screws for attachment of all gypsum board.

J. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
   2. Double-Layer Application: Install base layer using screws or nails. Install face layer using adhesive.

K. Air Barrier Seal: Continuously seal joint between gypsum board and top plate of exterior walls. Provide continuous perimeter sealant joint and sealant joint at all penetrations of upper most ceiling. Seal other joints and gaps to assure complete and continuous air seal.
   1. Refer to Section 07 25 00 for continuous air and weather barrier system.
   2. Refer to building section drawings for additional information.

L. Attach gypsum board to resilient channels between framing members.

M. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

3.6 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. Provide preliminary layout for approval prior to installation.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.7 JOINT TREATMENT


B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   4. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling and sanding is not required at base layer of double layer applications.

D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.8 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.9 SCHEDULE

A. Finish Levels: All walls and ceilings surfaces that receive a paint finish are to have the following joint treatment finish levels.
   1. Level 4 finish level: First Floor Retail Spaces, Public Restroom, Lobby, Corridors, Leasing Office, Multi-purpose Room, Residential Units.
   2. Level 2 finish level: Utility rooms, Mechanical Equipment rooms, and Electrical closets.

B. Wall Board Locations:
   1. Standard Gypsum Based Board: All other rooms not listed otherwise.
   2. Water-Resistant Wallboard: Wet areas as required

END OF SECTION 09 21 16
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. This Section includes non-load-bearing steel framing members for the following applications:
   1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
   2. Interior suspension systems (e.g., supports for drywall suspended ceilings and suspended drywall soffits, etc.).

B. Related Sections include the following:
   1. Section 06 10 00 "Rough Carpentry" for supplementary framing and solid blocking of support fixtures, etc.
   2. Section 07 21 00 "Thermal Insulation" for insulation installed with Z-shaped furring members.
   3. Section 09 21 16 "Gypsum Board Assemblies" for drywall ceilings.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM 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.

C. All thicknesses are based upon U.S. Standard gauge for uncoated sheets.
PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:
   1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
      a. Type: Postinstalled, expansion anchor.
   2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.
   1. Depth: 1-1/2 inches (38 mm).

E. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges, 3/4 inch (19.1 mm) deep.
   2. Steel Studs and Runners: ASTM C 645.
      a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm), unless otherwise indicated.
      b. Depth: 3-5/8 inches (92.1 mm), unless otherwise indicated.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
   a. Minimum Base Metal Thickness: 0.033 inch (0.84 mm), unless otherwise indicated.

4. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Products: Subject to compliance with requirements, provide one of the following:
      b. Chicago Metallic Corporation; Drywall Furring System.
      c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.0359 inch (0.91 mm) unless otherwise indicated.
   2. Depth: As indicated on drawings, and 1-5/8’ flange width.

B. Slip-Type Head Joints: Where indicated, provide one of the following:
   1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

C. 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.

D. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.
   1. Depth: 1-1/2 inches (38.1 mm).
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base Metal Thickness: 0.0359 inch (0.91 mm), unless otherwise indicated.
   2. Depth: 7/8 inch (22.2 mm).

F. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.

G. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.
   1. Depth: 3/4 inch (19.1 mm).
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0329 inch (0.84 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

2.4 AUXILIARY MATERIALS
A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:
1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistant materials from damage.

3.3 INSTALLATION, GENERAL
A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. 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, handrails, grab bars, toilet accessories, toilet compartments, markerboards, tackboards, wall mounted projection screens, furnishings, millwork, electrical devices and panels or similar construction.
   1. It is the responsibility of the metal framing subcontractor to coordinate blocking with all other trades.
   2. Solid blocking to be type of wood as required by code.

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.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

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, countersplaying, 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 required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

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

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. 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.

3.5 INSTALLING FRAMED ASSEMBLIES

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

B. Install studs so flanges within framing system point in same direction.
   1. Space studs as follows:
      a. Single-Layer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
      b. Multilayer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
      c. Tile backing panels: 16 inches (406 mm) o.c., unless otherwise indicated.

C. 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. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb, unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. 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.

4. 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.

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

6. 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 not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.

D. Direct Furring:
   1. Screw to wood framing.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 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.

END OF SECTION 09 22 16
SECTION 09 30 13 – CERAMIC TILING

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. This Section includes the following:

1. Unglazed mosaic floor tile (porcelain).
2. Colorbody Porcelain floor tile.
3. Tile stairs.
4. Glazed wall tile (ceramic).
5. Mosaic wall tile.
7. Marble thresholds installed as part of tile installations.
8. Waterproof and crack isolation membrane for thin-set tile installations.
9. Metal edge strips installed as part of tile installations.

B. Related Sections include the following:

1. Section 03 30 00 “Cast-in-Place Concrete” for monolithic slab finishes specified for tile substrates.
2. Section 05 51 13 “Metal Pan Stairs” for tile on stairs.
3. Section 07 92 00 “Joint Sealants” for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
4. Section 09 21 16 “Gypsum Board Assemblies” for tile backing panels.
5. Section 09 65 13 “Resilient Base and Accessories” for transition strips between differing flooring.

1.3 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.
1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.
2. Meets DCOF .42.

1.5 SUBMITTALS

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

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches (300 mm) square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Stone thresholds in 6-inch (150-mm) lengths.
5. Metal edge strips in 6-inch (150-mm) lengths.

E. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Material Test Reports: For each tile-setting and -grouting product and special-purpose tile.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:

1. Stone thresholds.
2. Waterproofing membrane.
4. Metal edge strips.

D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects, and qualities of materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and backing panels on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer’s written instructions.
1.9 EXTRA MATERIALS

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

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.


C. Colors, Textures, and Patterns: Where manufacturer’s standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As selected by Architect from manufacturer’s full range.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tiles in a factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS (FLOOR)

A. Basis of Design: Daltile; Div. of Dal-Tile International Inc.

B. Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Daltile; Div. of Dal-Tile International Inc.

C. Tile Type (CT – F1) Colorbody Porcelain

2. Facial Dimensions: 12 inches by 24 inches (29.56 cm by 59.44 cm).
3. Thickness: 3/8 inch (9.5 mm).
4. Face: Plain with square edges.
6. Color: Noir Linen – P689

2.4 TILE PRODUCTS (WALL)

A. Basis of Design: Daltile; Div. of Dal-Tile International Inc.

B. Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Daltile; Div. of Dal-Tile International Inc.

C. Tile Type (CT – W1) Glazed Wall Tile (Public Restrooms – Wet Walls)

1. Size: 12 inches by 12 inches (29.56 cm by 29.56 cm).
2. Thickness: 3/8 inch (7.9 mm).
3. Face: Plain with square edges.
4. Bullnose: Matching 3 inches x 12 inches bullnose at top of wainscot.
6. Color: Crème Linen - P686

2.5 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

B. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.
2. Description: Match Architect’s sample.
3. Description: Provide one of the following:
   a. White Marble or Beige Marble.
4. Marble thresholds to be one piece and 4" wide.

2.6 WATERPROOFING AND CRACK ISOLATION MEMBRANES

A. General: Manufacturer’s standard product that complies with ANSI A118.10 and ANSI A118.12 selected from the following and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene-Sheet Product: Polyethylene faced on both sides with fleece webbing for adhering to latex-portland cement mortar; 39 inches (1000 mm) wide by 0.008-inch (0.203-mm) nominal thickness.

1. Product: Subject to compliance with requirements, provide the following:
   a. Schluter Systems L.P.; KERDI.


1. Products: Subject to compliance with requirements, provide one of the following:
   a. LATICRETE International Inc.; Laticrete "Hydroban" Waterproof Membrane.
   b. MAPEI Corporation; "Aqua Defense".
   c. Custom Building Products; “RedGard” Waterproofing and Crack Prevention Membrane.

2.7 SETTING AND GROUTING MATERIALS

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

1. Custom Building Products.
2. LATICRETE International Inc.
3. MAPEI Corporation.
B. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A and as specified below:

1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1 mm) thick.
2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 inch by 2 inch (50.8 mm by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
   a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
   b. Configuration over Studs and Furring: Flat.
   d. Weight: 2.5 lb/sq. yd. (1.4 kg/sq. m), 3.4 lb/sq. yd. (1.8 kg/sq. m).
4. Latex Additive: Manufacturer’s standard acrylic resin water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix containing dry, re-dispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
2. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.
   a. For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

D. Water-Cleanable Epoxy Grout: ANSI A118.3, color as indicated. (Kitchen, Locker Rooms, Showers, Restroom Floors)

1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

E. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated. (All other areas)

1. Polymer Type: Either ethylene vinyl acetate, in dry, re-dispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
   a. Unsanded grout mixture for joints 1/16 inch (1.6 mm) and narrower.
   b. Sanded grout mixture for joints 1/8 inch (3.2 mm) and wider.
2.8 ELASTOMERIC SEALANTS

A. General: Provide manufacturer’s standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products:
   a. Dow Corning Corporation; Dow Corning 786.
   b. GE Silicones; Sanitary 1700.
   c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
   d. Tremco, Inc.; Tremsil 600 White.

D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

1. Products:
   c. Pecora Corporation; NR-200 Urexpan.
   d. Tremco, Inc.; THC-900.
   e. Sika Corporation; Sikaflex-2c SL.

E. Chemical-Resistant Sealants: For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout. Include primer and backer rod recommended by manufacturer.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
B. Metal Edge Strips: Schluter Systems angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, white zinc alloy, nickel silver, stainless steel; ASTM A666, 300 Series exposed-edge material.

1. Imagica Porcelain Plank to Resilient Tile Flooring:
   a. Schluter Systems RENO-U “100”.

C. Stairnosing: Schluter Systems TREP-S, 1” (25.4 mm) wide. Color as selected by Architect from manufacturer’s standard colors.

1. Grout release inform of manufacturer’s standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coat for tile.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Grout Sealer: Manufacturer’s standard silicone product for sealing grout joints that does not change color or appearance of grout.

1. Products:
   a. Custom Building Products; Surfaceguard Grout, and Tile Grout Sealer.
   b. Aqua Max “Sealers Choice”.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers’ written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer’s written instructions. Use product specifically recommended by tile-setting material manufacturer.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series “Specifications for Installation of Ceramic Tile” that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.


C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section “Joint Sealants.”

H. Grout tile to comply with requirements of the following tile installation standards:

1. For ceramic tile grouts latex-portland cement grouts, comply with ANSI A108.10.

3.4 WATERPROOFING MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer’s written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

   a. Tile floors in wet areas.
   b. Tile floors composed of tiles 1 inch by 1 inch (25 mm by 25 mm) or larger.

B. Joint Widths: Install tile on floors with the following joint widths:

1. Unglazed Mosaic Tile (Porcelain): 1/8 inch (3.16 mm).
2. Colorbody Paver Tile (Porcelain): 1/8 inch (3.16 mm).
C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent non-tile floor finish.

D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

E. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer’s written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that are on the tile faces by wiping with soft cloth.

3.6 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Install metal lath and scratch coat for walls to comply with ANSI A108.1A, Section 4.1.

C. Joint Widths: Install tile on walls with the following joint widths:

1. Glazed Wall Tile: 1/16 inch (1.6 mm).
2. Colorbody Porcelain Wall Tile: 1/8 inch (3.16 mm)

3.7 CEILING TILE INSTALLATION

A. Install types of tile designated for ceiling installations to comply with requirements in the Ceiling Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Install tile to comply with ANSI A108.5.

C. Joint Widths: Install tile on ceilings with the following joint widths:

1. Glazed Ceiling Tile: 1/16 inch (1.6 mm).

3.8 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer’s written instructions, but no sooner than 10 days after installation. Use only cleaners
recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.9 TILE INSTALLATION SCHEDULE

A. Floor Installation, Concrete Subfloor:

1. (FTI-I): TCNA F111-13 and ANSI A108.1A; cement mortar bed (thickset) with cleavage membrane.
   a. Tile Type: Unglazed mosaic (porcelain).
   c. Grout: Mapei “Kerapoxy IEG” or equal.

2. (FTI-II): TCNA F112-13 and ANSI A108.1B; cement mortar bed (thickset) bonded to concrete. Depress floor as per manufacturer’s recommended depth.
   a. Tile Type: Unglazed mosaic (porcelain), unglazed paver tile (porcelain), and Colorbody paver tile (porcelain).
   c. Grout: Mapei “Kerapoxy IEG” or equal.

   a. Tile Type: Unglazed paver tile (porcelain).
   b. Thin-Set Mortar: Latex portland cement mortar.
   c. Grout: Mapei “Kerapoxy IEG” or equal.

B. Interior Wall Installations, Wood or Metal Studs or Furring:

1. (WTI-II): TCNA W245-13; thinset mortar on glass-mat, water-resistant gypsum backer board. Waterproof membrane used only in “wet” areas.
   a. Tile Type: Glazed wall tile and Colorbody porcelain tile.
c. Grout: Polymer-modified sanded grout.

END OF SECTION 09 30 13
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. This Section includes the following:
   1. Resilient base.
   2. Floor finishing accessories.

B. Related Sections include the following:
   1. Section 09 65 19 “Luxury Vinyl Flooring”.
   2. Section 09 91 23 “Interior Painting”.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer’s standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: 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.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. RB-1 Resilient Base:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Burke Flooring.
      b. Flexco, Inc.
      c. Mannington.
      d. Roppe Corporation, USA.
   1. Material Requirement: Type TS (rubber, vulcanized thermoset).

C. Minimum Thickness: 0.125 inch (3.2 mm)

D. Height: 4 inches (102 mm)

E. Lengths: Coils in manufacturer’s standard length.

F. Corners:
   1. Outside: Preformed.
   2. Inside: Preformed.

G. Colors and Patterns: As selected by Architect from full range of industry colors to match existing.

2.2 FLOOR FINISHING ACCESSORIES

A. Transition Strips:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Roppe Corporation, USA.
      b. Mondo Rubber International, Inc.
      c. Johnsonite.
   2. Provide transition or reducer strips for the following based on Roppe Floor Finishing Accessories (unless noted otherwise). Transitions called out are based on a standard thickness of material. It is the responsibility of the Contractor/Subcontractor to verify all thickness of specified product material and differing floor transitions. (See drawings).
      a. Luxury Vinyl Tile to carpet (#67) 1/8" to 3/8".
   3. Color: As selected by Architect from manufacturer’s standard colors to match existing.
      a. Transition strip number XX references color selection code.

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 manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Cove Base Adhesives: Not more than 50 g/L.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer’s written instructions to ensure adhesion of resilient products.
B. Concrete Substrates for Accessories: 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 manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, 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, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
3.3 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 practicable 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.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer’s written instructions for installing resilient accessories.

Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of flooring that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

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.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13
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. Section Includes:
   1. Solid Vinyl Floor Tile (Luxury Vinyl Tile)
B. Related Sections:
   1. Section 09 65 13 "Resilient Base and Accessories" for resilient base, transition strips, and other accessories installed with resilient floor coverings.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.
C. Samples for Initial Selection: For each type of floor tile indicated.
D. Samples for Verification: Full-size units of each color and pattern of floor tile required.
E. Product Schedule: For floor tile, see drawings.
F. Qualification Data: For qualified Installer.
G. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
PART 2 - PRODUCTS

2.1 (LVT-1) LUXURY VINYL FLOOR TILE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Patcraft – Timber Grove
   2. Mannington Commercial – Walkway 20
   3. Armstrong World Industries
   4. Johnsonite; A Tarkett Company
   5. Roppe Corporation, USA
   6. Shaw Contract Group; a Berkshire Hathaway Company

B. Tile Standard: ASTM F 1700, Class 3, Type B.

C. Wearing Surface: Smooth.

D. Overall Thickness: .098 inch (2.5 mm).

E. Wear Layer Thickness: 20 mil (.020 inch / 5mm).

F. Finish: UV-cure polyurethane

G. Size: 6 inch x 36 inch or 6 inch x 48 inch.

H. Edge: Beveled.

I. Patterns: As shown on drawings.

J. Colors: As selected by Architect from full range of industry colors.
   1. Architect may select up to three (3) different colors or styles.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

3.2 PREPARATION

A. Prepare substrates according to 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 manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 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.

1. Lay tiles in pattern as shown on drawings.

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.

1. Lay tiles with grain direction.

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, non-staining 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.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply according to manufacturer’s recommendations.
E. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19
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. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Steel.
2. Galvanized metal.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Section 07 71 00 “Roof Specialties”
3. Section 07 72 00 “Roof Accessories”.
4. Section 07 92 00 “Joint Sealants” for painting of sealant.
5. Division 08 Sections for factory priming windows and doors with primers specified in this Section.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

B. Mockups: Apply benchmark samples 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 benchmark samples.
   a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (All paint materials are based on Kwal/Comex).

1. Benjamin Moore & Co.
2. Columbia Paint & Coatings.
3. Dunn-Edwards Corporation.
4. ICI Paints/PPG.
5. Insl-x.
8. Miller Paint.
10. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. 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.

B. Colors: As selected by Architect from manufacturer’s full range.

1. Primer: One Coat.
2. Finish: Two Finish Coats.

2.3 PAINT, MATERIALS

A. All Structural and Miscellaneous Steel Shall Receive:

1. 1 Coat Kwal Comex C309 Universal W/B Primer. MPI #107.
2. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.

B. All Hollow Metal Frames and Doors (Factory Primed) Shall Receive:

1. Touch-up factory primer.
2. 1 Coat Kwal Comex C309 Universal W/B Primer. MPI #107.
3. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.
C. All Steel Tube Outriggers Shall Receive:

1. 1 Coat Kwal Comex C309 Universal Primer. MPI #107.
2. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.

D. All Galvanized Metal, Exposed Mechanical Units on Roof, Exposed Mechanical Vent Hoods, Sheet Metal Flashing, and Coated Sheet Metal Shall Receive:

(All galvanized metal should be wiped down with galva-prep like product.)

1. 1 Coat Kwal Comex C309 Universal W/B Primer. MPI #134.
2. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.

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 work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor’s acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer’s written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that 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.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer’s written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. 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 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. 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.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 91 13
SECTION 09 91 23 - INTERIOR PAINTING

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. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
5. Gypsum board.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Section 05 52 13 "Pipe and Tube Railings" for paint on railings and handrails.
3. Section 07 92 00 "Joint Sealants" for painting of sealant.
4. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
5. Section 09 91 13 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

B. Mockups: Apply benchmark samples 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. Exposed CMU: Provide 100 sq. ft. sample for approval by Owner and Architect.
   b. Wall and Ceiling Surfaces: Provide sample draw down of 11” x 12”.
   c. Other Items: Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.

3. Final approval of color selections will be based on benchmark samples.
   a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (All paint materials are based on Kwal/Comex).

1. Benjamin Moore & Co.
2. Columbia Paint & Coatings.
3. Dunn-Edward Corporation.
4. ICI Paints/PPG.
5. Insl-x.
8. Miller Paint.
10. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. 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.

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

   a. Acrolein.
   b. Acrylonitrile.
   c. Antimony.
   d. Benzene.
   e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

C. Colors: As selected by Architect from manufacturer’s full range.

   1. Primer: One Coat.
   2. Finish: Two Coats of paint.
   3. Paint Color Selection:

      a. Field – One color.
      b. Accent – Five colors.

2.3 PAINT, MATERIALS

A. All Gypsum Board and Exposed Concrete (Other Than Those Receiving Epoxy Paint) Shall Receive:

   1. 1 Coat Kwal C1520006F UltraTech Multi-Solution Primer. MPI #50.
   2. 2 Coats Comex UltraTech C102 Latex Satin. MPI #43.

B. All Hollow Metal Doors and Frames Shall Receive:

   1. Touch-up factory primer.
   2. 1 Coat Kwal Comex C309 Universal W/B Primer. MPI #107.
   3. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.

C. Exposed Ceilings, Miscellaneous Steel or Metal, Exposed Structure, Exposed Conduit/Piping, and Exposed Ductwork Shall Receive:

   1. 2 Coats Kwal Comex C157 UltraTech Latex Flat Drywall. MPI #118.
D. Electrical Panel Boards Covers and Wall Mounted Registers or Grilles Shall Receive:
   1. 1 Coat Kwal Comex C309 Universal W/B Primer. MPI #107.
   2. 2 Coats Comex C-1520 Waterborne S/G DTM. MPI #153.

E. Apply shop primer to uncoated surfaces of metal stair components. Primer needs to be applied to surface embedded in concrete or masonry. Do not apply finish coat to surface embedded in concrete masonry.
   1. Railings:
      a. Primer: Kwal Comex E-10 Hi-Build Epoxy Primer/Finish Catalyzed.
      c. Stripe paint corner cervices, bolts, welds, and sharp edges.
         1) Two coat application.
         2) Color as selected by Architect.
   2. Handrails:
      a. Primer: Comex E-10 Hi-Build Epoxy Primer/Finish Catalyzed.
         1) Two coat application.
         2) Color as selected by Architect.

F. Gypsum Board (Epoxy Paint) Shall Receive:
   1. 1 Coat Kwal C1520006F UltraTech Multi-Solution Primer. MPI #50.
   2. 2 Coats Comex UltraTech C145 Pre-Catalyzed Epoxy. MPI #115.

G. Exposed CMU (Honed):
   1. 2 coats Comex E-7000 (clear) added with S/G Cure.

H. Painted Block Walls Shall Receive:
   1. 1 Coat Comex C302 UltraTech Block Filler. MPI #4.
      a. Provide block filler at 50 sq. ft.
   2. 2 Coats Comex UltraTech C102 Latex Satin. MPI #43.

I. Painted Block Walls (Epoxy Paint) Shall Receive:
   1. 1 Coat Comex C302 UltraTech Block Filler. MPI #4.
      a. Provide block filler at 50 sq. ft.
   2. 2 Coats Comex UltraTech C145 Pre-Catalyzed Epoxy. MPI #115.
J. Concrete Benches (Locker Rooms) Shall Receive:

1. 2 Coats Comex E-10 Solvent Borne Epoxy. MPI #98.
   a. Concrete must age 30 days prior to application.
   b. Muriatic acid etching prior to application.
   c. Color: As selected by Architect.

K. Exposed Epoxy Painted Concrete Floors Shall Receive:

1. 2 Coats Comex E-7000 Pigmented Acrylic Epoxy. MPI #93. (Add a fine walnut shell non-slip additive)
   a. Concrete must age 30 days prior to application.
   b. Muriatic acid etching prior to application.
   c. Color: “Gray” as selected by Architect.

2.4 STAINING OF INTERIOR FINISH, WOOD

A. All Interior Finish Carpentry Shall Receive:

1. 1 coat Kwal 8709 Wood Kraft Interior/Exterior Alkyd Wood Stain. Apply until desired color is achieved to match wood doors. Color as approved by Architect.
2. 2 coats Gemini Pre-Catalyzed 510-0052 Satin Lacquer.

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 work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

   1. Concrete: 12 percent.
   3. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
1. Beginning coating application constitutes Contractor’s acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer’s written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that 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.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
   
   1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer’s written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer’s written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer’s written instructions.
   
   1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. 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.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Tanks that do not have factory-applied final finishes.
   e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:
   a. Switchgear.
   b. Panelboards.
   c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. 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.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 91 23
### DIVISION 10 – SPECIALTIES

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PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section is delegated design and includes signage required by code only:
   1. Accessible entries and routes.
   2. Accessible Public Restrooms.
   3. Accessible Parking.
   4. Electrical Rooms.
   5. Elevator Machine Rooms.
   6. Accessible Public Restrooms.
   7. Fire Riser Room.
   9. Stairs.
   10. Other signage deemed necessary by Authority Having Jurisdiction.

B. Balance of signage will be owner provided and installed.

C. Work of this Section includes owner provided:
   1. Interior wall-mounted dimensional letters.
   2. Interior sign program.
   3. Fabrication, installation and sign permits for all signs in this package.

D. Design/Regulatory Requirements:
   1. Provide signage that conforms to applicable requirements of ANSI A117.1, IBC and the Americans with Disabilities Act (ADA) Accessibility Guidelines.

1.2 SYSTEM DESCRIPTION

A. Standards: Comply with applicable standards of sign products industry and construction industry for selection of materials, fabrication of components, assembly, and installation/erection of the system, except to the extent more explicit or stringent requirements are indicated.

1.3 SUBMITTALS

A. See Section 01 30 00: Submittal Procedures.

B. Fabricator must submit the following:
   1. Product Data: Submit manufacturers’ specifications and installation instructions for all manufactured materials and products. Include manufacturers’ certifications and laboratory test reports as specified.
2. **Shop Drawings:** Fabricator to produce and submit shop drawings and product data, including mounting details for all sign types. Indicate sign layout, copy, letter form, spacing, dimensions, elevations, and connection details. Indicate sign location and connection to mounting surface.

3. **Samples:**
   a. Submit one (1) sample of each Sign type and one (1) sample of all mounting systems to be used. The owner reserves the right to disassemble any item and subject items to any test necessary to determine its strength or character without being responsible for any damage to the item caused thereby.
   b. Submit for approval three (3) color samples for each of the color matches.
   c. **Submittal Schedule:** Shop drawings and material samples shall be submitted together in a complete manner to the Designer as specified and as required to cause no delay in the work.
   d. It is the responsibility of the fabricator to schedule submittals to allow sufficient time for possible revision and resubmittal of any rejected submittals, without interfering with the fabrication and construction schedules.
   e. **Statement of Application:** Before commencing installation of the Work, submit written statement signed by Contractor and Installer stating they have completely examined the requirements of the Contract Documents and the manufacturer’s instructions, the areas in which the Work would be installed, and the conditions under which the Work would be performed. The statement shall stipulate Contractor and Installer are in agreement that the substrates, materials and application methods to be used in the Work comply with the requirements and are adequate and proper for the conditions of installation and use.

### 1.4 QUALITY ASSURANCE

A. **Supplier qualifications:** Engage an experienced supplier who has completed fabrication and installation of signage similar in design and extent to that required for this project and which has resulted in construction with a record of successful in-service performance.
   1. Unless otherwise specified for an individual product or material, supply all products specified in this section from the same manufacturer.

B. **Standards of quality:** Provide all materials and labor necessary to complete the proposed construction.
   1. Use only personnel thoroughly skilled and experienced with the products and method for fabrication and installation of signage specified.
   2. Work done and materials furnished shall be first-class in every respect and, unless otherwise specified, materials and equipment shall be new and the latest design.
   3. The owner shall reserve the right to reject any shop drawings, samples or other submittals, as well as any finished product or installation that cannot meet the standard of quality established. Any such decision will be considered final and not subject to recourse.

C. **Typography:**
   1. Copy on detail drawings attached to these specifications are generic and intended for layout and spacing only. Actual copy for all signs is listed in the message schedule. A shop
drawing submittal is required for approval of alternate letter size or other layout changes as a result of an exceptionally long message or other special condition.

2. Stated dimensions on the drawings shall take precedence over scaled dimensions. Serious conflicts between stated and scaled dimensions must be resolved prior to fabrication.

3. All letterforms shall be in the same sans serif family of typefaces, to be selected. Letter spacing shall suggested by fabricator and approved by architect. Icons, symbols and graphics to be provided by fabricator.

D. Inks and Paints:
1. All inks and paints shall be compatible with the surface on which they are applied and recommended by the manufacturer of the ink or paint. All inks and paints used shall be of a type containing ultraviolet inhibitor to protect against fading and discoloration. All inks and paints shall be evenly applied and without pinholes, scratches, orange peeling, application marks, etc.

2. Workmanship in connection with finishes and formation of letters shall conform to the highest standards of the trade and shall be acceptable to Graphics Consultant. All interior painted surfaces to have a semi-matte or “Eggshell” finish.

3. Color Matches: Provide the following color matches – TBD

E. Raised letters and Braille:
1. Where required, all raised letters and Braille shall be produced using the process “Photo Polymer.” For exterior applications, use 1/8-inch solid Photo Polymer or superior exterior-grade product. A sample of interior and exterior grade Photo Polymer must be submitted by the fabricator and approved by Graphics Consultant through the Architect.

2. All Braille will be Grade 2 Braille, in compliance with the American with Disabilities Act. Placement of the Braille shall be located as shown on drawings. The fabricator is responsible for proper use of Grade 2 Braille in terms of size, placement, and spelling, including proper contractions.

3. If any recent governmental promulgations have altered the use of raised letters and Braille, so as to impact the accompanying drawings, those new uses should be utilized and indicated in fabricator’s shop drawings.

1.5 WARRANTY

A. General: Provide a written warranty indicating all work of this Bid Lot, excluding vinyl lettering products will be free from defects in material and workmanship for a period of five (5) years after Owner acceptance and that for a period of five (5) years after Owner acceptance repairs/replacements and said defects shall be performed in a timely manner at no expenses to the Owner.

B. Vinyl Lettering: Provide a written warranty indicating all vinyl lettering will be free from defects in material and workmanship for a period of one (1) year after Owner acceptance and that for a period of one (1) year after Owner acceptance repairs/replacements and said defects shall be performed in a timely manner at no expense to the Owner.
1.6 **DELIVERY, STORAGE AND HANDLING**

A. Store products of this section in protective packaging until installation.

B. Maintain dry, climate controlled storage area for products of this section until installation of products.

**PART 2 - PRODUCTS**

2.1 **MANUFACTURERS**

A. Acceptable Manufacturer / Basis of Design: Sign Wizards

B. Other Manufacturers: Comply with substitution procedure, Section 01 60 00.

2.2 **MATERIALS AND FABRICATION**

A. General: All materials shall be new stock, free from defects impairing strength, durability and appearance. All fabrication and installation shall be in accordance with the highest standards of the trade. All signs and components shall be complete and free from visual and structural/mechanical flaws.

B. Vinyl Lettering:
   1. All cut vinyl letters are to be pressure sensitive vinyl. 3M Brand Scotch Cal approved. All vinyl cutting shall be executed in such a manner that all edges and corners of finished letter forms are true and clean. Letter forms with rounded positive or negative corners, nicked, cut or ragged edges, etc. will not be accepted.
   2. Sign material laminates shall utilize proper adhesives, be smooth, consistent and free of bubbles, bulging, and foreign matter, and guaranteed not to delaminate nor cause discoloration or deterioration of any materials used in fabrication.
   3. Align letterforms to maintain a base line parallel to the sign format. Margins must be maintained as specified by sign type diagrams.
   4. All edges of letterforms shall be sharp and clean with no edge buildup or bleeding. All surfaces or letterforms shall be without pinholes.

C. Hardware: Provide hardware in sizes, types and finishes shown and specified. Where hardware is indicated but not specifically specified or hardware is required by manufacturer, submit hardware sizes, types and finishes for review.

D. Acrylic Signs:
   1. Sign construction shall be as indicated on attached construction drawings.
   2. Sign finish to be semi-matte, smooth, free of scratches, gouges and other imperfections. Incorporate ultraviolet inhibitor into sign materials to produce maximum color stability. Sign edges shall be straight, smooth and free of cutting marks and other imperfections.
   3. Sign material laminates shall utilize proper adhesives, be smooth, consistent and free of bubbles, bulging, and foreign matter, and guaranteed not to delaminate nor cause discoloration or deterioration of any materials used in fabrication.
4. Align letterforms to maintain a base line parallel to the sign format. Margins must be maintained as specified by sign type diagrams.

5. All edges of letterforms shall be sharp and clean with no edge buildup or bleeding. All surfaces or letterforms shall be without pinholes.

E. Painting and Finishing:
1. All inks and paints shall be evenly applied in a clean environment and without pinholes, scratches, orange peeling, application marks, etc. Workmanship in connection with finishes and formation of letters shall conform to the highest standards of the trade and shall be acceptable to the owner.

2. All etched materials shall be paint filled or left as uncolored metal as specified. Graphic images shall be etched into the substrate using a photochemical process. All fills shall be of durable paint fill. Fills shall not chip nor lose paint.

F. Screen Printing:
1. Disposition of color shall be even and opaque.

2. There shall be 100% fidelity between film positives and screen. Provide 100% film positive, emulsion side up and clean.

3. Double strikes of screened artwork which show as double images, faint or fuzzy line and edge quality shall not be accepted if visible when viewed from 5 feet or the normal viewing distance, whichever is closer.

4. Screen artwork shall not noticeably deviate from the film positives in line weight.

5. The fabricator shall determine the optimum mesh size for screen printing.

G. Typography:
1. Copy on detail drawings attached to these specifications are generic and intended for layout and spacing only. Actual copy for all signs is listed in the message schedule found at the end of this Section. A shop drawing submittal is required for approval of alternate letter size or other layout changes as a result of an exceptionally long message or other special condition.

2. Stated dimensions on drawings shall take precedence over scaled dimensions. In case of gross contradictions or ambiguities, seek clarification from Graphics Consultant.

3. There is one family of typefaces used in this sign program. Alternate letterforms will be unacceptable. Letter spacing shall be as shown on drawings.
   a. Font: TDB

H. Grade 2 Braille: Braille is specified in those sign types where ADA rules apply. The fabricator is responsible for proper use of Grade 2 Braille in terms of size, placement, and spelling including proper contractions.

2.3 INTERIOR SIGNS

A. Interior Signage package is to include all code required signage whether it is listed below or not. The following products listed herein are scoping documents based on the current drawings but no detailed signage program has been developed. Sign products listed below are indicative of the typical signs associated with the building program, but the supplier/ installer is to provide a complete signage package for review and approval by the owner prior to fabrication.

1. List additional Code required signage when submitting pricing for the signage package.
B. Sign Type ID-E: Elevator Firecode Message
   1. Sign Materials: TBD, subject to architects approval.
   2. Width: 4" or width of elevator call button panel, whichever is greater.
   3. Height: 8"
   4. Graphics: Typeface TBD. Graphics to be provided by fabricator, subject to architects approval.
   5. Colors: TBD, subject to architects approval.
   6. Construction Details: Coordinate in shop drawings
   7. Installation: Sign contractor to verify width of elevator call button panel and provide dimensions on shop drawings for approval. Sign is centered with bottom edge of sign flush with top edge of elevator call button panel.
   8. Copy: “In case of fire do not use elevator, use stairway for exit”
   9. Quantity: 7

C. Sign Type ID-R: ADA Compliant Minor Room Identification
   1. Sign Materials: TBD, subject to architects approval
   2. Size: 12" wide x 12" high O.A.
   3. Graphics: Type TBD. Graphics to be provided by fabricator, subject to architects approval.
   4. Colors: TBD, subject to architects approval
   5. Construction Details: TBD, subject to architects approval
   6. Installation: Coordinate in shop drawings. Install with edge of sign 4" from frame of latch side of door and center of sign 60" above floor.

D. Sign Type ID-D: ADA Compliant Destination Signage
   1. Sign Materials: TBD, subject to architects approval.
   2. Size: TBD, subject to architects approval
   3. Graphics: Typeface TBD. Graphics to be provided by fabricator, subject to architects approval.
   4. Colors: TBD, subject to architects approval
   5. Construction Details: Coordinate in shop drawings
   6. Installation: Coordinate in shop drawings. Install with edge of sign 4" from frame of latch side of door and center of sign 60" above floor.

E. Sign Type ID-S: ADA Compliant Stair Landing Identification
   1. Sign Materials: TBD, subject to architects approval.
   2. Size: 12" wide x 12" high O.A.
   3. Graphics: Type TBD. Graphics to be provided by fabricator, subject to architects approval.
   4. Colors: TBD, subject to architects approval
   5. Construction Details: Sign panel edges are smooth finished before coating.
   6. Installation: Coordinate in shop drawings. Install with edge of sign 4" from frame of latch side of door and center of sign 60" above floor.

F. Sign Type CR: Other code required signage
   1. All other code required signage shall be determined by Contractor for review by Architect
2.4 EXTERIOR SIGNS

A. Sign Type B1: Building Identification (Address)
   1. Sign material: TBD, subject to architects approval.
   2. Graphics: Type Vinyl, subject to architects approval.
   3. Message size: TBD.
   4. Colors: Solid, contrasting color, subject to architects approval.
   5. Construction Details: Coordinate in shop drawings
   6. Installation: Locate in center of transom window above door. (center letters directly above door) All lettering shall be executed in such a manner that all edges and corners of letter forms are true, clean, photographically precise and must accurately reproduce the typeface. Messages shall be smooth and free of air bubbles, open cuts, bulging and foreign matter between message and application surface.
   7. Copy: To be determined (official building address)
   8. Quantity: TBD

B. Sign Type B2: Building Identification signage
   1. Material: TBD, subject to architects approval
   2. Size: TBD, subject to architects approval
   3. Type Face: style selected by Architect.
   4. Message TBD: (assume 20 letters as basis for bidding).
   5. Quantity: TBD.

C. Sign Type B3: Exterior ADA Compliant Minor Room Identification
   1. Exterior Entry to the following spaces:
      a. Finish: TBD, subject to architects approval
      b. Construction Details: Coordinate in Shop Drawings

PART 3 - EXECUTION

3.1 INSTALLATION

A. All sign installations shall comply with the guidelines of the Americans with Disabilities Act.

B. The supplier is responsible for staking all sign locations and field verifying with contracting officer before installing signs.

C. The supplier is responsible for securely installing all signs. When the type of mounting is not otherwise specified, all signs shall be permanently mounted.

D. Install all items as described in specifications and shown in drawings provided. If site conditions do not allow for sign placement as described herein, seek advice from architect. Check all items for correct placement.
E. Make all provisions necessary and take special precautions to protect and prevent damage to Owner's property. Any items damaged shall be restored to the original condition and the supplier charged with the expense thereof.

F. All wall-mounted sign panels are to be installed in such a way that wall surfaces are not damaged. Use 3M pressure sensitive double-sided vinyl tape and/or screws as specified.

G. Maintain a clean work area; remove all crating and debris from project site at the end of each work day and when installation is complete.

3.2 CLEANING AND PROTECTION

A. Clean signs after installation. Remove fingerprints. No exposed installation adhesives shall be allowed on the exposed surface of the sign or its background surface. Clean or polish items as required by manufacturers' instructions. Touch up any scratched surfaces as necessary.

END OF SECTION 10 14 00
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. This Section includes the following:
      1. Overhead Braced and Floor-Anchored, Solid Phenolic Toilet Compartments.
      2. Floor Anchored Privacy Screens (Urinals).
   B. Related Sections include the following:
      1. Section 055000 "Metal Fabrications" for supports that attach units to wall.
      2. Section 102800 "Toilet and Bath Accessories" for grab bars and similar accessories.

1.3 REFERENCES

1.4 SUBMITTALS
   A. Product Data: Submit manufacturer’s detailed technical data for materials, fabrication, and
      installation, including catalog cuts of anchors, hardware, fasteners, and accessories.
   B. Shop Drawings: For fabrication and installation of Toilet Compartment and Screen assemblies.
      Include plans, elevations, sections, details, and attachments to other work.
   C. Samples for Initial Selection:
      1. Submit manufacturer’s color chart with manufacturer’s full range of standard colors. Color
         shall be selected on a basis of four (4) stalls or more per color.
      2. Submit certification that materials furnished comply with requirements specified.
   D. Sample for Verification:
      1. Submit 6” square samples of each color and finish on same substrate used in work, for
         color verification after selections have been made.
2. Submit one (1) sample of the following:

   a. Hardware (Complete)
   b. Pilaster (12" x 12")
   c. Divider Panel (12" x 12")
   d. Continuous Aluminum Mounting Bracket (57.5")
   e. Continuous 14 Gauge Stainless Steel Hinge (57.5")

E. Maintenance Instructions: Provide manufacturer’s printed Instructions for Maintenance of Installed Work.

F. Written Warranty.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to Established Dimensions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle compartments as recommended by manufacturer to protect from damage.

1.7 MANUFACTURER’S WARRANTY

A. Provide manufacturer’s written standard warranty against breakage, corrosion, delamination, and defects in workmanship; to be replaced without charge, excluding labor. Provide manufacturer’s written standard warranty on hardware.

PART 2 - PRODUCTS

2.1 PHENOLIC-CORE UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Columbia Series 58000 Phenolic Partition as manufactured by PSISC or comparable product by one of the following:

1. American Accessories, Inc.
2. Bradley Corp.; Mills Partitions.
3. DesignRite Toilet Partitions.
4. Flush Metal Partition Corp.
5. Global Steel Products Corp.

2.2 MATERIALS

A. General: Provide material which has been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable. Solid Phenolic shall meet or exceed all requirements for Class “B” Flame Spread Rating calculated according to ASTM E-84-91A, and shall carry a UL Class “B” Fire Rating Certification.

B. Material shall be Solid Phenolic with a High Pressure Melamine matte finish surface made as an integral part of the core material. Laminated surfaces are not acceptable.

1. Doors – Minimum 0.75” (19 mm) Finished Thickness.
2. Divider Panels – Minimum 0.50” (12.5 mm) Finished Thickness.
3. Pilasters – Minimum 0.75” (19 mm) Finished Thickness.

C. Colors: To be selected by Architect from Manufacturer’s Standard Colors.

D. Pilaster Shoes: ASTM A 167, Type 302/304 Stainless Steel, minimum 4” high, 18 gauge, finished with #3 Directional Polish, attached with Stainless Steel Through Bolts.

E. Continuous Brackets: Full High (57.5”) 1/8” Extruded 6063-T5 Aluminum with a Satin Anodized finish. The minimum weight shall be 1.685 pounds per lineal foot. Inside of opening of Bracket shall be 0.75” for panels, 1.00” for pilasters. All holes for mounting to wall and panel/pilaster shall be pre-drilled. (Provide solid block shims at all gaps where fasteners are applied.) Holes are to be spaced at 9” O.C. along the full length of the Bracket for a total of fourteen (14) holes for mounting to the wall and seven (7) holes for mounting to the panel/pilaster. Each Bracket is to have a minimum wall thickness of 0.125”. Each Bracket is to be packaged in a separate poly tube, and is to be labeled by stock number and manufacturer.

F. Continuous Hinge: Continuous 14 Gauge Stainless Steel Hinge (57.5”). Hinge shall be 3” wide and shall have five (5) Stainless Steel wire springs for self-closing action. Pivot pin shall be 0.250” in diameter, and shall be made of Type 302/304 Stainless Steel. Hinges shall provide emergency access by lifting the door. Hinges shall be pre-drilled for mounting to door and pilaster. Mounting holes shall be 9“ O.C. for Through-Bolting with Stainless Steel fasteners. Each Hinge is to be packaged in a separate poly tube, and is to be labeled by stock number, manufacturer, and left or right hand.

G. Strike and Keeper: Heavy Duty Cast Stainless Steel with a Satin finish. The Strike and Keeper shall be 2.50” high, with the mounting holes at 1.50” O.C., and the wall thickness shall be a minimum of 0.125”. The Strike and Keeper shall have an integral rubber bumper door stop. The stock number shall be molded into the back of the Strike and Keeper for ease in identification.
Each Strike and Keeper shall be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer. Furnish one per door.

H. Slide Latch: Heavy Duty Cast Stainless Steel with a Satin finish. The Slide Latch shall be surface mounted. The slide bar shall be 0.150" thick, 1.020" wide and 3.720" long. Latch shall have an internal Stainless Steel buffering spring to prevent damage when door is inadvertently slammed against the Latch. Mounting holes are to be spaced at 3.50" O.C. Latch knob is to be riveted to the slide bar and then welded to insure that the knob will not come off. The stock number is to be molded into the back of the Slide Latch for ease in identification. Each Slide Latch shall be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer. Furnish one per door.

I. Coat Hook: Heavy Duty Cast Stainless Steel with a Satin finish. Coat Hook and Bumper shall be 2.340" high, 1.230" wide and shall protrude out from the door 3.05". The hook portion shall have a finished diameter of 0.250". The stock number shall be molded into the back of the Coat Hook and Bumper for ease in identification. Each Coat Hook and Bumper shall be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer. Furnish one per door.

J. Door Stop: Heavy Duty Cast Stainless Steel with a Satin finish. Plated Zamac Door Stops are unacceptable. Door Stop shall have a 2.125" base diameter and shall protrude 1.80" from the wall. The bumper at the end of the Door Stop shall be 0.250" thick. The diameter of the shaft shall be 0.6875". The stock number shall be molded into the back of the Door Stop for ease in identification. Each Door Stop shall be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer. Furnish one for each Disabled Accessible door.

K. Pull Handle: Heavy Duty Cast Stainless Steel with a Satin finish. Plated Zamac Door Pulls are unacceptable. Pull Handle shall protrude from the face of the door 0.940" and shall be 4.735" long. The Pull Handle shall have mounting holes drilled and tapped for 10/24 threads at 3.50" O.C. The Pull Handles shall be 0.655" wide and shall be mounted back to back with the Slide Latch. The stock number shall be molded into the back of the Pull Handle for ease in identification. Each Pull Handle shall be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer. Furnish one for each Disabled Accessible door.

L. Overhead Bracing (Headrail): Continuous Heavy Duty Extruded 6063-T5 Aluminum Headrail with Anti-Grip profile. Headrail shall have integral reinforcing channel and curtain track. Headrail shall have a Satin Anodized finish. Provide Headrail Corner Brackets, Wall Brackets, and Headrail End Caps as required. The Headrail and Headrail Brackets shall have a minimum wall height of 2". The minimum wall thickness of the Headrail and Headrail Brackets shall be .125". Each Headrail Bracket is to be packaged in a separate poly bag, and is to be labeled by stock number and manufacturer.

M. Anchorages and Fasteners: All fasteners shall be Stainless Steel with theft proof heads, Through-Bolted unless noted otherwise. Chrome plated steel or brass are not acceptable.
2.3 FABRICATION

A. General: Provide standard doors, panels, screens and pilasters fabricated for compartment system, complete with all accessories and hardware listed above and as required for installation of fully functional system, unless otherwise noted. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars as indicated.

B. Overhead-Braced and Floor-Anchored Partitions:

1. Furnish Heavy Duty Cast Stainless Steel “Z” Bars, complete with Stainless Steel threaded rods, lock washers and leveling-adjusting nuts at pilaster, to permit structural connection at floor.
2. Make provision for setting and securing continuous Extruded Aluminum Anti-Grip Headrail at top of each pilaster.
3. Furnish Stainless Steel Shoe at each pilaster to conceal supports and leveling mechanism.

C. Doors: Unless otherwise indicated, provide 24” (610 mm) wide in-swinging doors for standard Toilet Compartments and 36” (914 mm) wide out-swinging doors with a minimum 32” (813 mm) wide clear opening for Compartments indicated to be Handicapped Accessible.

D. Floor Anchored Privacy Screens (Urinals): Furnish Privacy Screen consisting of a pilaster and a panel of the same construction and finish as the Toilet Compartments. Furnish in accordance with the drawings.

   1. Provide full height bracket.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer’s written installation instructions. Install Compartments rigid, straight, plumb, and level. Provide clearances of not more than 0.50” (13 mm) between pilasters and panels, and not more than 1.0” (25 mm) between panels and walls. No evidence of drilling, cutting and patching shall be visible in finished work.

B. Overhead-Braced and Floor-Anchored Partitions: Secure pilasters to floor and level, plumb, and tighten. Secure continuous Headrail to each pilaster with not less than two (2) Through-Bolted Stainless Steel fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer’s written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ACCESSORIES

A. Mount accessories to Compartment units in accordance with manufacturer’s instructions.
3.3 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer’s written instructions for proper operation.

B. Provide final protection and maintain conditions that ensure Toilet Compartments and Screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10 21 13.17
SECTION 10 26 00 – WALL AND DOOR PROTECTION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Corner guards.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

C. Manufacturer’s Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wall and Corner Guards:
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. (CG-1) Corner Guards - Surface Mounted over continuous retainer, minimum 0.060” (1.52 mm) thick.
   1. Material: High-impact vinyl acrylic extrusion locked in place, nominal 0.078” (1.98 mm) thick. Class 1/A fire rating, tested in accordance with ASTM E84.
   2. Size: 2 x 2” inches.
   3. Corner: Square.
   4. Color: As selected by Architect from Manufacturer’s standard colors.
2.3 FABRICATION

A. Pre-drill holes for attachment.
B. Ease all edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.2 INSTALLATION

A. Install components in accordance with manufacturer’s instructions, level and plumb, secured
B. rigidly in position to wall framing members only.

3.3 TOLERANCES

A. Maximum Variation from Required Height: 1/4 inch.
B. Maximum Variation from Level or Plane for Visible Length: 1/4 inch.

END OF SECTION 10 26 00
SECTION 10 28 00 – TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Accessories for toilet rooms, showers and residential bathrooms.

B. Grab bars.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Samples: Submit two samples of each accessory, illustrating color and finish.

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Products listed are made by Symmons and Bobrick.

B. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Adhesive: Two component epoxy type, waterproof.

2.3 2.4 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf with Mop/Broom Holders and Rag Hooks: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights and Locations: As required by accessibility regulations, as indicated on drawings, and as follows:

3.3 SCHEDULE

A. Public Bathrooms:
   1. TP-1 (Toilet Paper Dispenser):
      a. Manufacturer: Bobrick
      b. Style: B-2721
      c. Color: Satin Finished Stainless Steel
   2. PTD-1 (Paper Towel Dispenser/Waste Receptacle):
      a. Manufacturer: Bobrick
      b. Style: B-4369
      c. Color: Satin Finished Stainless Steel
   3. SC-1 (Seat Cover Dispenser):
      a. Manufacturer: Bobrick
      b. Style: B-221
      c. Color: Satin Finished Stainless Steel
   4. CH-1 (Coat Hook):
      a. Manufacturer: Bobrick
      b. Style: B-6717
      c. Color: Satin Finished Stainless Steel
   5. SD-1 (Soap Dispenser):
      a. Manufacturer: Bobrick
      b. Style: B-4112
      c. Color: Satin Finished Stainless Steel
   6. GB-1 (Grab Bars):
      a. Manufacturer: Bobrick
      b. Style: B-5806
      c. Mounting: Flanges with concealed tamper-resistant fasteners.
d. Color: Satin Finished Stainless Steel, 0.05 inch (1.3 mm) thick.

e. Outside Diameter 1-1/4 inches (32 mm)

f. Provide manufacturer’s stainless steel snap flange covers to conceal mounting screws.

7. M-1 (Mirror Unit):
   a. Mirror shall have one-piece, polished stainless steel 1/2” x 1/2” x 1/2” channel frame. Mirror frame shall have 90° uniform corners; open or uneven mitered corners are not acceptable. Mirror shall be No. 1 quality, 1/4” float/plate glass. All mirror edges shall be protected by filler strips. Mirror back shall be protected by full-size shock-absorbing, water-resistant, non-abrasive 1/8” thick polyethylene padding.
   b. Mounting: Galvanized steel back with formed edges.
   c. Size: As indicated on drawings.

END OF SECTION 10 28 00
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Accessories.

1.2 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.
B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.3 SUBMITTALS

A. See Section 01 30 00 - Submittal Procedures.
B. Shop Drawings: Indicate cabinet physical dimensions.
C. Product Data: Provide extinguisher operational features.
D. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.
E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.
PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers, Cabinets and Accessories:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

B. CFC, HCFC and Halon are prohibited.

C. Dry Chemical Type Fire Extinguishers: Cast steel tank, with pressure gage.
   1. Class A:B:C.
   2. Size: 2A10BC.
   3. Finish: Baked enamel, red color.

D. Wet Chemical Type Fire Extinguishers: Stainless-steel container, with pressure-indicating gage. (Use in Kitchen)
   1. Class: UL-rated 2-A:1-B:C:K.
   2. Size: 2.5 gallon.
   3. Finish: Baked enamel, red color.

2.3 FIRE EXTINGUISHER CABINETS

A. Box Metal: Formed primed steel sheet; 0.036 inch thick base metal.

B. Cabinet Configuration: Recessed type, typical, surface type at garage.
   1. Sized to accommodate accessories.
   2. Trim: Stainless steel, returned to wall surface, with 5/16 inch projection, 1 inch wide face at typical fully recessed cabinets; formed steel at garage installations.

B. Door: Architectural Series, 0.036 inch thick stainless steel, reinforced for flatness and rigidity at typical recessed, and reinforced formed steel at garage; Hinge doors for 180 degree opening with continuous piano hinge. Provide latch with nylon catch.

C. Door Glazing: Vertical duo clear 1/8 inch thick acrylic. Set in resilient channel gasket glazing.
D. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

E. Weld, fill, and grind components smooth.

F. Finish of Cabinet Exterior Trim and Door: No. 4 stainless steel and baked enamel finish, white color at garage installations.

H. Finish of Cabinet Interior: White enamel.

2.4 ACCESSORIES

A. Seismic bracket for extinguisher.

B. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.

C. Black vertical cut die cut letters.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Secure rigidly in place.

C. Place extinguishers in cabinets.

END OF SECTION 10 44 00
SECTION 10 55 23 – MAIL BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Multiple mail boxes with hinged and locked doors.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for components.

C. Shop Drawings: Indicate locations, construction and anchorage details, dimensions, rough-in openings sizes, quantity and arrangement of box sizes.
   1. Show field measurements on shop drawings.

D. Manufacturer’s Instructions: Include installation procedures, special considerations, and maintenance information.

1.3 QUALITY ASSURANCE

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Mail Boxes:
   1. Manufacturer: Design Basis; Florence Corporation
      a. Product – Vital Cluster Box Unit – 1570-12SD.

2.2 MAIL BOXES SERVED BY U.S. POSTAL SERVICE

A. Comply with U.S. Postal Service Standard 4C.

2.3 COMPONENTS

A. Front Loading Panel Frame:
   1. Aluminum with mill finish.
B. Box Door:
   1. Aluminum with mill finish.

B. Box Construction: Sheet steel, zinc coated, 22 gage thick, fabricated into modular stackable units, baked enamel flat black finish. Pre-punch bolt holes in box for stack bolting to each other andanchoring to adjacent construction; label plates for identifying each box.

D. Nominal Box Sizes: Configured as follows:
   1. Box Depth: 15 inches.
   2. Mail Box: 3”H x 12”W.
   3. Parcel Box: 19-5/8”H x 12”W x 15”D.

E. Postal Box Locks: USPS standard, two keys per box.

F. "Out-Going Mail" Lock Box: Face plate to match front loading panel frame, box of galvanized steelconstruction, 3”H x 12”W size, lockable with cylinder provided by Post Office.

G. Aluminum Finish: Thermally fused polymer powder system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and U.S. Postal Service regulations.

B. Install and secure boxes in position, neatly, and accurately stacked.

C. Install doors and adjust to operate smoothly.

END OF SECTION 10 55 23
DIVISION 12 – FURNISHINGS

12 36 61.16  SOLID SURFACING COUNTERTOPS
SECTION 12 36 61.16 – SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Solid surface countertops for public restrooms.

1.2 REFERENCE STANDARDS

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
G. PS 1 - Structural Plywood; 2009.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.
C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
D. Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
F. Installation Instructions: Manufacturer’s installation instructions and recommendations.
G. Maintenance Data: Manufacturer’s instructions and recommendations for maintenance and repair of countertop surfaces.
1.4 QUALITY ASSURANCE
   A. Fabricator Qualifications: Same fabricator as cabinets on which tops are to be installed.
   B. Installer Qualifications: Fabricator.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer’s unopened packaging until ready for installation.
   B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 FIELD CONDITIONS
   A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s absolute limits.

PART 2 - PRODUCTS

2.1 COUNTERTOP ASSEMBLIES
   A. Solid Surface Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
      1. Flat Sheet Thickness: 3/4 inch, minimum.
      2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISSFA-2 and NEMA LD 3; orthopthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
         a. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
         b. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
         c. NSF approved for food contact.
         d. Finish on Exposed Surfaces: As noted in schedule at end of Part 3.
         e. Color and Pattern: As scheduled.

2.2 ACCESSORY MATERIALS
   A. Wood-Based Component Requirements:
      1. Wood fabricated from old growth timber is not permitted.
B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

D. Joint Sealant: Mildew-resistant silicone sealant, color to match laminate.

2.3 FABRICATION

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
3.3 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

A. Variation from Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset from Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.5 CLEANING

A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.7 SCHEDULES

A. SS-1
   1. Location: Public Restrooms
   2. Manufacturer: Wilsonart
   3. Product: Solid Surface
   5. Thickness: 13 mm, cut to size

END OF SECTION 12 36 61.16
DIVISION 14 – CONVEYING EQUIPMENT

14 24 00 HYDRAULIC ELEVATORS
SECTION 14 24 00 - HYDRAULIC ELEVATORS

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. This Section includes hydraulic passenger elevators.

B. Related Sections include the following:

1. Section 03 30 00 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
2. Section 05 12 00 "Structural Steel Framing" for the following:
   a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
   b. Divider beams.
   c. Hoist beams.
   d. Structural-steel shapes for subsills that are part of steel frame.
3. Section 05 50 00 "Metal Fabrications" for the following:
   a. Attachment plates and angle brackets for supporting guide-rail brackets.
   b. Divider beams.
   c. Hoist beams.
   d. Structural-steel shapes for subsills.
   e. Cants in hoistways made from steel sheet.
4. Section 07 11 00 "Underslab Vapor Barrier".
5. Section 09 65 19 "Resilient Tile Flooring" for finish flooring in elevator cars.
6. Section 09 91 23 "Interior Painting" for field painting of hoistway entrance doors and frames.
7. Division 26 Sections for electrical service for elevators to and including fused disconnect switches at machine room door and standby power source, transfer switch, and connection from auxiliary contacts in transfer switch to controller.
8. Division 27 Sections for telephone service for elevators.
1.3 **DEFINITIONS**

A. Definitions in ASME A17.1 apply to work of this Section.

B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

C. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 **SUBMITTALS**

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:

1. Car enclosures and hoistway entrances.
2. Operation, control, and signal systems.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples for Initial Selection: For finishes involving color selection.

D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

E. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section “Operation and Maintenance Data,” include diagnostic and repair information available to manufacturer’s and Installer’s maintenance personnel.

F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

G. Warranty: Special warranty specified in this Section.
1.5 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain elevators, including wheelchair lifts specified in another Division 14 Section, through one source from a single manufacturer.
   1. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

C. Regulatory Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.


E. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to UL 10B.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer’s protective packaging.

B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer’s written recommendations to prevent damage, deterioration, or soiling.

1.7 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

B. Furnish well casing and coordinate delivery with related excavation work.

C. Coordinate sequence of elevator installation with other work to avoid delaying the Work.

D. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.
1.8 WARRANTY

A. Special Manufacturer’s Warranty: Manufacturer’s standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year’s full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
   a. Response Time: Two hours or less.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design-Product: Subject to compliance with requirements, provide ThyssenKrupp Elevator Model – Endura, Twinpost Holeless or comparable product by one of the following:

1. KONE Inc.
2. Otis Elevator Co.
3. Schindler Elevator Corp.

B. Elevator company to provide pit ladder.

SUMMARY

A. Stops: 2; Front Opening.
B. Travel Distance: 14'-0" or as indicated.
C. Minimum Overhead Clearance: 12'-5".
D. Rated Net Capacity: 2100 lbs.
E. Rated Speed: 100 ft./min.
2.2 SYSTEMS AND COMPONENTS

A. General: Provide manufacturer’s standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.

B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide the following:

1. Pump, with fan-cooled squirrel-cage induction motor, mounted on oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch- (25-mm-) thick, glass-fiber insulation board.
2. Submersible pump, with submersible squirrel-cage induction motor, suspended inside oil tank from vibration isolation mounts.
3. Provide motor with solid-state starting.
4. Provide variable-voltage variable-frequency motor control.

C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.

D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.

1. Provide dielectric couplings at cylinder units.

E. Hydraulic Fluid: Elevator manufacturer’s standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.

F. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.

G. Car Frame and Platform: Welded steel units.

H. Guides: Provide either roller guides or sliding guides at top and bottom of car and counterweight frames. If sliding guides are used, provide guide-rail lubricators or polymer-coated, nonlubricated guides.
2.3  OPERATION SYSTEMS

A. General: Provide manufacturer’s standard microprocessor operation system for each elevator as required to provide type of operation system indicated.

B. Single-Car Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevator:

1. Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.

2. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.

C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters’ service.

1. Card-Reader Operation: System uses card readers at hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Provide stripe-swipe card reader integral with each car control station.
   
   a. Security access system equipment is specified in Division 28 Section “Electronic Access Control.”
   
   b. Security access system equipment is not in the Contract.

2. Elevator needs to include wiring and controller provisions at or near the hall stations to interface with a card reader system.

2.4  DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.
2.5 **FINISH MATERIALS**

A. **General:** Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.

B. **Cold-Rolled Steel Sheet:** ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.

C. **Hot-Rolled Steel Sheet:** ASTM A1011/A1011M, commercial steel, Type B, pickled.

D. **Stainless-Steel Sheet:** ASTM A240/A240M, Type 304.

E. **Stainless-Steel Bars:** ASTM A276, Type 304.

F. **Stainless-Steel Tubing:** ASTM A554, Grade MT 304.

G. **Bronze Plate and Sheet:** ASTM B36/B36M, Alloy UNS No. C28000 (muntz metal).

H. **Bronze Extrusions:** ASTM B455, Alloy UNS No. C38500 (architectural bronze).

I. **Bronze Tubing:** ASTM B135 (ASTM B135M), Alloy UNS No. C23000 (red brass, 85 percent copper).

J. **Aluminum Extrusions:** ASTM B221 (ASTM B221M), Alloy 6063.

K. **Nickel Silver Extrusions:** ASTM B151/B151M, Alloy UNS No. C74500 or No. C77600.

L. **Plastic Laminate:** High-pressure type complying with NEMA LD 3.

2.6 **CAR ENCLOSURES**

A. **General:** Provide enameled-steel car enclosures to receive non-removable wall panels, with removable car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.

2. Provide finished car including materials and finishes specified below.

B. **Materials and Finishes:** Provide manufacturer’s standards, but not less than the following:

1. **Subfloor:** Underlayment grade, exterior plywood, 5/8-inch (16-mm) nominal thickness.

2. **Floor Finish:** Luxury Vinyl Tile (LVT) installed by others.

3. **Wall Panels:** Decorative high-pressure type, comply with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050” thickness. Colors as selected by Architect from manufacturer’s full range.

4. Fabricate car with recesses and cutouts for signal equipment.

5. Fabricate car door frame integrally with front wall of car.

7. Sight Guards: Provide sight guards on car doors.

8. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.

9. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.

10. Handrails: Manufacturer’s standard handrails, of shape, metal, and finish indicated.

2.7 HOISTWAY ENTRANCES

A. General: Provide manufacturer’s standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer’s standards, but not less than the following:

1. Stainless-Steel Frames: Satin stainless steel, no. 4 finish.
2. Stainless-Steel Doors: Satin stainless steel, no. 4 finish.
4. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.

2.8 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs.

B. Swing-Return Car Control Stations: Provide car control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.

1. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
2. Provide “No Smoking” sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board’s “Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).” On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring
station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. Firefighters’ Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters’ two-way telephone communication service specified in Division 28 Section ‘Fire Detection and Alarm.”

E. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

F. Hall Push-Button Stations: Provide one hall push-button station at each landing.

G. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

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

3.2 INSTALLATION

A. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.

D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.

E. Install piping above the floor, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.

F. Lubricate operating parts of systems as recommended by manufacturers.

G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

H. Leveling Tolerance: 1/4 inch (6 mm), up or down, regardless of load and direction of travel.

I. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

J. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
   1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
   2. Place hall lanterns either above or beside each hoistway entrance.
   3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to operate, adjust, and maintain elevator(s). Refer to Division 01 Section “Demonstration and Training.”

B. Check operation of elevator with Owner’s personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.
C. Check operation of elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 24 00