PROJECT MANUAL

RANCHO PARK GOLF CLUBHOUSE RENOVATION

10460 W Pico Blvd
Los Angeles, CA 90064

City of Los Angeles
Department of Recreation and Parks

VOLUME 2 of 2
DIVISION 01 THROUGH 33

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SECTION 01 56 39 - TREE AND PLANT PROTECTION-

PART 1 – GENERAL

1.01 SUMMARY

A. The scope of work includes all labor, materials, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with protection of existing trees and other plants as shown on the drawings and as specified herein.

1. Obtain preconstruction evaluations by the Department of Recreation and Parks Urban Forester
2. Provide tree and plant protection fencing.
3. Provide protection of root zones and above ground trees to be protected
4. Provide pruning of existing trees and plants
5. Coordinate with the requirements of Section 329300 Planting for modifications to the soil within the root zone of existing trees and plants.
6. Provide maintenance of existing trees and plants including irrigation during the construction period as recommended by the arborist report.
7. Provide maintenance of existing trees and plants including irrigation during the post construction plant maintenance period.
8. Remove tree protection fencing and other protection from around and under trees and plants.
9. Clean up and disposal of all excess and surplus material.

1.02 CONTRACT DOCUMENTS

A. Shall consist of specifications and general conditions and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

B. It is the intent of this section that the requirements apply to all sections of the project specification such that any subcontractor must comply with the restrictions on work within designated Tree Protection Areas.

1.03 RELATED DOCUMENTS AND REFERENCES

A. RELATED DOCUMENTS:

1. Drawings and general provisions of contract including general and supplementary conditions and Division I specifications apply to work of this section.

Section 32 93 00 - Planting

Section – 32 84 13 Irrigation

B. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of

this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.

2. ANSI A 300 (Part 5) – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current editions.
3. Pruning practices shall conform with recommendations “Structural Pruning: A Guide For The Green Industry”; Published by Urban Tree Foundation, Visalia, California; most current edition.
4. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign Il, most current edition.

1.04 VERIFICATION

A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Project Manager of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Project Manager.

1.05 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Project Manager in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Project Manager shall determine which shall govern.

1.06 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to his/her actions.

1.07 CHANGES IN THE WORK

A. The Project Manager may order changes in the work, and the contract sum should be adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

1.08 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Project Manager, at the soonest possible time that can be coordinated with other work and seasonal weather demands.

1.09 DEFINITIONS

All terms in this specification shall be as defined in the “Glossary of Arboricultural Terms” or as modified below.

A. Project Manager: The person appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Project Manager may appoint other persons to review and approve any aspects of the work.

B. Reasonable and reasonably: When used in this specification is intended to mean that the conditions cited will not affect the establishment or long term stability, health or growth of the plant. This specification recognizes that plants are not free of defects, and that plant conditions change with time. This specification also recognizes that some decisions cannot be totally based on measured findings and that profession judgment is required. In cases of differing opinion, the Project Manager expert shall determine when conditions within the plant are judged as reasonable.

C. Shrub: Woody plants with mature height approximately less than 25 feet.

D. TPZ - Tree Protection Zone - The radius (not the diameter) of the TPZ, measured from the outside of the tree trunk, shall be calculated according to the following:
   1. Single trunk trees - multiply the trunk diameter in inches, measured 4.5’ above grade, by 1.5 feet.
   2. Multi trunk trees - multiply the sum of the diameters of all trunks in inches, measured 4.5’ above grade, by 1.5 feet.
   3. Palm trees - 5’ from the base of the trunk.
   4. If a TPZ is delineated on the plans, the size and shape shown on the plans shall supercede the above requirements
   5. No work is permitted within the TPZ without the approval of: 1) the project Landscape Architect, 2) the Project Manager, and 3) RAP Forestry staff. Any work authorized by RAP Forestry staff within the TPZ must be done in accordance with the recommendations of RAP Forestry and under the supervision of a Monitoring Arborist. The Monitoring Arborist shall be supplied by the Contractor at his own expense, and be an ISA Certified Arborist or a Registered Consulting Arborist with verifiable experience in protecting trees. The Monitoring Arborist must be approved by RAP Forestry prior to commencement of work.

E. Within the TPZ the contractor shall adhere to the following requirements, including, but not limited to:
   1. No stockpiling or storage of any material, debris, or soil.
   2. No storage of any construction equipment.
   3. No vehicular access.
   4. No un-approved trenching, excavation or disturbance of soil will be allowed.
   5. No objects of any kind shall be attached to tree trunks.
   6. For any approved excavation or trenching, no cutting of roots over 2” diameter will be allowed. Contractor shall use a pneumatic drill (a.k.a. “air spade”) to excavate under woody roots larger than 2” in diameter. If any roots are unintentionally severed, remedial cuts are to be made under the supervision the Monitoring arborist, and soil backfilled immediately.

F. Within the boundaries of the construction zone (including the TPZ), the contractor shall be responsible for mitigating construction-related dust accumulation on all trees by spraying the trunks, limbs, and foliage with water to a maximum height of 30 feet during the months of April through November, at monthly intervals.

G. Beyond the TPZ, the contractor shall also be responsible for protecting all existing trees to

remain in place within the boundaries of the construction zone, including vehicular access areas, lay down areas, and any other areas impacted by construction activities. Any damage to trees in these areas shall also be subject to the same monetary or replacement requirements specified below. Any necessary root cutting in this area must be approved in advance by an approved ISA certified arborist employed by the Contractor and approved by the Owners' Representative. . See also the General Conditions for any damage done by the contractor to landscaping or other park amenities that fall outside the boundaries of the construction zone.

H. Irrigation to all existing trees NOT specifically designated for removal shall be kept in operation for the duration of the project. Contractor shall be responsible for hand watering all impacted trees if necessitated by temporary shutdowns to or demolition of existing irrigation systems. Trees are to be irrigated deeply and as often as required such that soil moisture is detectable at a minimum depth of 18" using a soil probe.

I. Upon completion of all trenching, grading, excavation and soil preparation work, contractor shall remove all items installed to protect trees during the construction process with approval of the Project Manager.

J. Any of the following Southern California native tree species fall under Ordinance No. 177404 of the Los Angeles Municipal Code:
   1. Oaks, including
      a. Valley Oak (Quercus lobata)
      b. California Live Oak (Quercus agrifolia), or any other tree of the oak genus indigenous to California but excluding Scrub Oak (Quercus dumosa);
      c. Southern California Black Walnut (Juglans californica var. californica);
      d. Western Sycamore (Platanus racemosa);
      e. California Bay (Umbellularia californica).

K. Contractor shall comply with the requirements of the ordinance found at: http://cityplanning.lacity.org/Code_Studies/Other/ProtectedTreeOrd.pdf.

1.10 SUBMITTALS

A. ARBORIST REPORT: Prior to the start of construction, obtain an evaluation of the existing trees to be protected by the Department of Recreation and parks urban forester that details the following information the report shall include the following:

   1. A description of each tree to remain indicating its genus and species, condition including any visible damage to the root system or soil within the root zone, tree diameter at breast height (dbh) and approximate height, size and any visible disease, insect infestations and or branch and trunk structural deficiencies.

   2. The report shall note all trees or parts of trees, which are considered a hazard or significant or extreme risk level. Include the International Society of Arboriculture hazard evaluation sheet for each tree, which may reasonably be identified as a potential hazard tree.

   3. Recommendations as to treatment of all insect, disease and structural problems encountered.

   4. Recommendations for fertilizer treatments, if any.

   5. A plan of the site showing the location of all trees included in the report.

L. PRODUCT DATA: Submit manufacturer product data and literature describing all products required by this section to the Project Manager for approval. Provide submittal four weeks before the start of any work at the site.

1.11 OBSERVATION OF THE WORK

A. The Project manager may inspect the work at any time.

1.12 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre - construction meeting with the Project Manager at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

The following Contractors shall attend the preconstruction conference:
General Contractor.
LARAP Arborist or Urban Forester
Subcontractor assigned to install Tree and Plant Protection measures.
Earthwork Contractor.
All site utility Contractors that may be required to dig or trench into the soil.
Landscape subcontractor.
Irrigation subcontractor

B. Prior to this meeting, mark all trees and plants to remain and or be removed as described in this specification for review and approval by the Owner's Representative.

1.13 QUALITY ASSURANCE

A. Contractor qualifications:

1. All pruning, branch tie back, tree removal, root pruning, and fertilizing required by this section shall be performed by or under the direct supervision of the LA RAP.
2. All applications of pesticide or herbicide shall be performed by a person maintaining a current state license to apply chemical pesticides valid in the jurisdiction of the project. Submit copies of all required state licensing certificates including applicable chemical applicator licenses.

PART 2 – PRODUCTS

2.1 MULCH

A. Mulch shall be coarse, bark or wood chips from tree and woody brush sources. The minimum range of fine particles shall be 3/8 inch or less in size and a maximum size of individual pieces shall be approximately 1 to 1-1/2 inch in diameter.

B. Submit suppliers product data that product meets the requirements and two gallon sample for approval.

2.2 TREE PROTECTION FENCING:

A. CHAIN LINK FENCE: The contractor shall install a 5’ high temporary chain link fence with one pedestrian access gate along the boundary of the TPZ.

B. GATES: For each fence type and in each separate fenced area, provide a minimum of one 3 foot wide gate. Gates shall be lockable. The location of the gates shall be approved by the Owner's Representative.

C. Submit suppliers product data that product meets the requirements for approval.

2.3 TREE PROTECTION SIGN:

A. Heavy-duty cardboard signs, 8.5 inches x 11 inches, white colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the tree

protection fence every 20 feet o.c. The tree protection sign shall read “Do Not Remove Fencing. Tree and Plant Protection Area- Keep Out”.

2.4 MATTING

A. Matting for vehicle and work protection shall be heavy duty matting designed for vehicle loading over tree roots, Alturnamats as manufactured by Alturnamats, Inc. Franklin, PA 16323 or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

2.5 GEOGRID

A. Geogrid shall be woven polyester fabric with PVC coating, Uni-axial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, acids.

1. Geogrid shall be Miragrid 2XT as manufactured by Ten Cate Nicolon, Norcross, GA. http://www.tencate.com or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

2.6 FILTER FABRIC

A. Filter Fabric shall be nonwoven polypropylene fibers, inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

1. Mirafi 135 N as manufactured by Ten Cate Nicolon, Norcross, GA. http://www.tencate.com or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

PART 3 – EXECUTION

3.1 SITE EXAMINATION

A. Examine the site, tree, plant and soil conditions. Notify the Project Manager in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

3.2 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of Work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines currently present on the irrigation plan, heads or the conduits of other utility lines or structures that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Project Manager of any conflicts encountered.

3.3 TREE AND PLANT PROTECTION AREA: The Tree and Plant Protection Area is defined as all areas indicated on the tree protection plan. Where no limit of the Tree and Plant Protection area is defined on the drawings, the limit shall be the drip line (outer edge of the branch crown) of each tree.

3.4 PREPARATION:

A. Prior to the preconstruction meeting, layout the limits of the Tree and Plant Protection Area and then alignments of required Tree and Plant Protection Fencing and root pruning. Obtain the Project Manager's approval of the limits of the protection area and the alignment of all fencing and root pruning.

B. Flag all trees to be removed by wrapping orange plastic ribbon around the trunk and obtain the Project Manager's approval of all trees and shrubs to be removed prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.

C. Flag all trees and shrubs to remain with white plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the Project Manager's approval of all trees and shrubs to be remain prior to the start of tree and shrub removal.

D. Prior to any construction activity at the site including utility work, grading, storage of materials, or installation of temporary construction facilities, install all tree protection fencing, Filter Fabric, silt fence, tree protection signs, Geogrid, Mulch and or Wood Chips as shown on the drawings.

3.5 SOIL MOISTURE

A. Volumetric soil moisture level, in all soils within the Tree and Plant Protection Area shall be maintained above permanent wilt point to a depth of at least 8 inches. No soil work or other activity shall be permitted within the Tree and Plant Protection Area when the volumetric soil moisture is above field capacity. The permanent wilt point and field capacity for each type of soil texture shall be defined as follows (numbers indicate percentage volumetric soil moisture).

Soil type	**Permanent wilt point v/v**	**Field capacity v/v**
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

1. Volumetric soil moisture shall be measured with a digital, electric conductivity meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent meter.

B. The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend operations until the soil moisture drains to below field capacity.

3.6 ROOT PRUNING:

A. Prior to any excavating into the existing soil grade within 25 feet of the limit of the Tree Protection Area or trees to remain, root prune all existing trees to a depth of 24 inches below existing grade in alignments following the edges of the Tree and Plant Protection

Area or as directed by the Project Manager. Root pruning shall be in conformance with ANSI A300 (part 8) latest edition.

1. Using a rock saw, chain trencher or similar trenching device, make a vertical cut within 2 feet of the limit of grading.
2. After completion of the cut, make clean cuts with a lopper, saw or pruner to remove all torn root ends on the tree side of the excavation, and backfill the trench immediately with existing soil, filling all voids.

3.7 INSTALLATION OF GEOGRIDS, FILTER FABRIC, MATTING, WOOD CHIPS AND OR MULCH

A. Install Wood Chips and or Mulch in areas and depths shown on the plans and details or as directed by the Owner's representative. In general it is the intent of this specification to provide the following levels of protection:
   1. All areas within the Tree and Plant Protection area provide a minimum of 5 inches of Wood Chips or Mulch.
   2. Areas where foot traffic or storage of lightweight materials is anticipated to be unavoidable provide a layer of Filter Fabric under the 5 inches of Wood Chips or Mulch.
   3. Areas where occasional light vehicle traffic is anticipated to be unavoidable provide a layer of Geogrids under 8 inches of Wood Chips or Mulch.
   4. Areas where heavy vehicle traffic is unavoidable provide a layer of Geogrids under 8 - 12 inches of Wood Chips or Mulch and a layer of matting over the Wood Chips or Mulch.

B. The Owner's Representative shall approve the appropriate level of protection.

C. In the above requirements, light vehicle is defined as a track skid steer with a ground pressure of 4 psi or lighter. A heavy vehicle is any vehicle with a tire or track pressure of greater than 4 psi. Lightweight materials are any packaged materials that can be physically moved by hand into the location. Bulk materials such as soil, or aggregate shall never be stored within the Tree and Plant Protection Area.

3.8 PROTECTION:

A. Protect the Tree and Plant Protection Area at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves and roots of all plants; and contamination of the soil, bark or leaves with construction materials, debris, silt, fuels, oils, and any chemicals substance. Notify the Project Manager of any spills, compaction or damage and take corrective action immediately using methods approved by the Project Manager.

3.9 GENERAL REQUIREMENTS AND LIMITATIONS FOR OPERATIONS WITHIN THE TREE AND PLANT PROTECTION AREA:

A. The Contractor shall not engage in any construction activity within the Tree and Plant Protection Area without the approval of the Owner's Representative including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks. Permitted activity, if any, within the Tree and Plant Protection Area maybe indicated on the drawings along with any required remedial activity as listed below.

B. In the event that construction activity is unavoidable within the Tree and Plant Protection Area, notify the Project Manager and submit a detailed written plan of action for approval. The plan shall include: a list of remedial actions that will reduce the impact on the Tree and Plant Protection Area from the activity. Remedial actions shall include but

shall not be limited to the following:

1. In general, demolition and excavation within the drip line of trees shall proceed with extreme care either by the use of hand tools, directional boring and or Air Knife excavation where indicated or with other low impact equipment that will not cause damage to the tree, roots or soil.
2. When encountered, exposed roots, 1 inches and larger in diameter shall be worked around in a manner that does not break the outer layer of the root surface (bark). These roots shall be covered in Wood Chips and shall be maintained above permanent wilt point at all times. Roots one inch and larger in diameter shall not be cut with out the approval of the owners representative. Excavation shall be tunneled under these roots without cutting them. In the areas where roots are encountered, work shall be performed and scheduled to close excavations as quickly as possible over exposed roots.
3. Tree branches that interfere with the construction may be tied back or pruned to clear only to the point necessary to complete the work. Other branches shall only be removed when specifically indicated by the Project Manager. Tying back or trimming of all branches and the cutting of roots shall be in accordance with accepted arboricultural practices (ANSI A300, part 8) and be performed under supervision of the arborist.
4. Matting: Install temporary matting over the Wood Chips or Mulch to the extent indicated. Do not permit foot traffic, scaffolding or the storage of materials within the Tree and Plant Protection Area to occur off of the temporary matting.
5. Air Excavation Tool: If excavation for footings or utilities is required within the Tree and Plant Protection Area, air excavation tool techniques shall be used where practical or as designed on the drawings.

a. Remove the Wood Chips from an area approximately 18 inches beyond the limits of the hole or trench to be excavated. Cover the Wood Chips for a distance of not less than 15 feet around the limit of the excavation area with Filter Fabric or plastic sheeting to protect the Wood Chips from silt. Mound the Wood Chips so that the plastic slopes towards the excavation.

b. Using a sprinkler or soaker hose, apply water slowly to the area of the excavation for a period of at least 4 hours, approximately 12 hours prior to the work so that the ground water level is at or near field capacity at the beginning of the work. For excavations that go beyond the damp soil, rewet the soil as necessary to keep soil moisture near field capacity.

c. Using an air excavation tool specifically designed and manufactured for the intended purpose, and at pressures recommended by the manufacturer of the equipment, fracture the existing soil to the shape and the depths required. Work at rates and using techniques that do not harm tree roots. Air pressure shall be a maximum of 90-100 psi.

   1.) The air excavation tool shall be “Air-Spade” as manufactured by Concept Engineering Group, Inc., Verona, PA (412) 826-8800, or Air Knife as manufactured by Easy Use Air Tools, Inc. Allison Park, Pa (866) 328-5723 or approved equal.

d. Using a commercial, high-powered vacuum truck if required, remove the soil from the excavation produced by the Air Knife excavation. The vacuum truck should generally operate simultaneously with the hose operator, such that the soil produced is picked up from the excavation hole, and the exposed roots can be observed and not damaged by the ongoing operation. Do not drive the vacuum truck into the Tree and Plant Protection

Area unless the area is protected from compaction as approved in advance by the Project Manager.

e. Remove all excavated soil and excavated Wood Chips, and contaminated soil at the end of the excavation.

f. Schedule the work so that foundations or utility work is completed immediately after the excavation. Do not let the roots dry out. Mist the roots several times during the day. If the excavated area must remain open over night, mist the roots and cover the excavation with black plastic.

g. Dispose of all soil in a manner that meets local laws and regulations.

h. Restore soil within the trench as soon as the work is completed. Utilize soil of similar texture to the removed soil and lightly compact with hand tools. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.

i. Restore any Geogrids, Filter Fabric, Wood Chips or Mulch and or matting that was previously required for the area.

3.10 TREE REMOVAL:

A. Remove all trees indicated by the drawings and specifications, as requiring removal, in a manner that will not damage adjacent trees or structures or compacts the soil.

B. Remove trees that are adjacent to trees or structures to remain, in sections, to limit the opportunity of damage to adjacent crowns, trunks, ground plane elements and structures.

C. Do not drop trees with a single cut unless the tree will fall in an area not included in the Tree and Plant Protection Area. No tree to be removed within 50 feet of the Tree and Plant Protection Area shall be pushed over or up-rooted using a piece of grading equipment.

D. Protect adjacent paving, soil, trees, shrubs, ground cover plantings and understory plants to remain from damage during all tree removal operations, and from construction operations. Protection shall include the root system, trunk, limbs, and crown from breakage or scarring, and the soil from compaction.

E. Remove stumps and immediate root plate from existing trees to be removed. Grind trunk bases and large buttress roots to a depth of the largest buttress root or at least 18 inches below the top most roots which ever is less and over the area of three times the diameter of the trunk (DBH).
   1. For trees where the stump will fall under new paved areas, grind roots to a total depth of 18 inches below the existing grade. If the sides of the stump hole still have greater than approximately 20% wood visible, continue grinding operation deeper and or wider until the resulting hole has less than 20% wood. Remove all wood chips produced by the grinding operation and back fill in 8 inch layers with controlled fill of a quality acceptable to the site engineer for fill material under structures, compacted to 95% of the maximum dry density standard proctor. The Project Manager shall approve each hole at the end of the grinding operation.
   2. In areas where the tree location is to be a planting bed or lawn, remove all woodchips and backfill stump holes with planting soil as defined in Specification Section Planting Soil, in maximum of 12 inch layers and compact to 80 - 85% of the maximum dry density standard proctor.

3.11 PRUNING:

A. Within six months of the estimated date of substantial completion, prune all dead or hazardous branches larger than 2 inch in diameter from all trees to remain.

B. Implement all pruning recommendations found in the arborist report.

C. Prune any low, hanging branches and vines from existing trees and shrubs that overhang walks, streets and drives, or parking areas as follows:
   1. Walks - within 8 feet vertically of the proposed walk elevation.
   2. Parking areas - within 12 feet vertically of the proposed parking surface elevation.
   3. Streets and drives - within 14 feet vertically of the proposed driving surface elevation.

D. All pruning shall be done in accordance with ANSI A300 (part 1), ISA BMP Tree Pruning (latest edition, and the "Structural Pruning: A Guide for the Green Industry", Edward Gilman, Brian Kempf, Nelda Matheny and Jim Clark, 2013 Urban Tree Foundation, Visalia CA.

E. Perform other pruning task as indicated on the drawings or requested by the Owner's Representative.

F. Where tree specific disease vectors require, sterilize all pruning tools between the work in individual trees.

3.12 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants to be preserved during the entire construction period. Adequate water is defined to be maintaining soil moisture above the permanent wilt point to a depth of 8 inches or greater.

B. The Contractor shall adjust the automatic irrigation system, if available, and apply additional water, using hoses or water tanks as required.

C. Periodically test the moisture content in the soil within the root zone to determine the water content.

3.13 WEED REMOVAL

A. During the construction period, control any plants that seed in and around the fenced Tree and Plant Protection area at least three times a year.
1. All plants that are not shown on the planting plan or on the Tree and Plant Protection Plan to remain shall be considered as weeds.

B. At the end of the construction period provide one final weeding of the Tree and Plant Protection Area.

3.14 INSECT AND DISEASE CONTROL

A. Monitor all plants to remain for disease and insect infestations during the entire construction period. Provide all disease and insect control required to keep the plants in a healthy state using the principles of Integrated Plant Management (IPM). All pesticides shall be applied by a certified pesticide applicator.

3.15 CLEAN-UP

A. During tree and plant protection work, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.
   1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and

neighboring property.

B. Once tree protection work is complete, wash all soil from pavements and other structures. Ensure that Mulch is confined to planting beds.

C. Make all repairs to grades, ruts, and damage to the work or other work at the site.

D. Remove and dispose of all excess Mulch, Wood Chips, packaging, and other material brought to the site by the Contractor.

3.16 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION

A. At the end of the construction period or when requested by the Project Manager remove all fencing, Wood Chips or Mulch, Geogrids and Filter Fabric, trunk protection and or any other Tree and Plant Protection material.

3.17 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

A. Any trees or plants designated to remain and which are damaged by the Contractor shall be replaced in kind by the Contractor at their own expense. Trees shall be replaced with a tree of similar species and of equal size and quality. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available which ever is less. Where replacement plants are to be less than the size of the plant that is damaged, the Project Manager shall approve the size and quality of the replacement plant.
   1. All trees and plants shall be installed per the requirements of Specification Section Planting.

B. Plants that are damaged shall be considered as requiring replacement or appraisal in the event that the damage affects more than 25 % of the crown, 25% of the trunk circumference, or root protection area, or the tree is damaged in such a manner that the tree could develop into a potential hazard. Trees and shrubs to be replaced shall be removed by the Contractor at his own expense.
   1. The Owner's Representative may engage an independent arborist to assess any tree or plant that appears to have been damaged to determine their health or condition.

C. Any tree that is determined to be dead, damaged or potentially hazardous by the Owner’s arborist and upon the request of the Project Manager shall be immediately removed by the Contractor at no additional expense to the owner. Tree removal shall include all clean up of all wood parts and grinding of the stump to a depth sufficient to plant the replacement tree or plant, removal of all chips from the stump site and filling the resulting hole with topsoil.

D. Any remedial work on damaged existing plants recommended by the consulting arborist shall be completed by the Contractor at no cost to the owner. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators (TGR).

E. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

END OF SECTION 015639

DIVISION 02
EXISTING CONDITIONS

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 01 10 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse or storage.
C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at **Project site**.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

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

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

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

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

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

1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
2. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

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

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."

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

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.[Comply with requirements in Section 017419 "Construction Waste Management and Disposal."]

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

C. Removed and Salvaged Items:

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

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition[**and cleaned**] and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings.

F. Roofing: Remove existing roofing. Protect the building interior remains, keep watertight and weathertight. See Roof Plan for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

DIVISION 03
CONCRETE

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SECTION 03 20 00 - CONCRETE REINFORCING

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 materials and placement requirements for mild steel reinforcement used in reinforced concrete.

B. Related Requirements:

1. Division 03 Section “Concrete Formwork” for materials and construction of concrete forms.
2. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete mix design, curing, finishing and concrete strength testing of laboratory- and field-cured cylinders
3. Division 03 Section “Shotcrete” for mix design, curing, finishing and testing of shotcrete

C. Reference Documents: Comply with the provisions of the documents listed below and with the requirements described in this Section. Use current editions of documents unless earlier editions are specifically referenced by the governing code or are otherwise indicated.

1. CBC – 2022 California Building Code.
2. ACI - American Concrete Institute,

    a. ACI 117, “Standard Specifications for Tolerances for Concrete Construction and Materials”.
    b. ACI 301, “Specification for Structural Concrete for Buildings”.
    c. ACI 315, “Details and Detailing of Concrete Reinforcement”.

3. ASTM - American Society for Testing and Materials, designations referenced herein.
4. AWS - American Welding Society,

    a. AWS D1.1, “Structural Welding Code - Steel”.
    b. AWS D1.4, “Structural Welding Code - Reinforcing Steel”.

5. CRSI - Concrete Reinforcing Steel Institute,

    a. CRSI MSP-1, “Manual of Standard Practice”.
    b. CRSI, “Placing Reinforcing Bars”.

6. ICC-ES - International Code Council Evaluation Services, Evaluation Reports referenced herein.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include ICC-ES evaluation reports, construction details, material descriptions, dimensions of individual components and profiles, and finishes for:

a. Mechanical couplers
b. Reinforcing bar terminators
c. Deformed bar anchors
d. Headed stud shear reinforcing
e. <**Insert Product Here**>

B. LEED Submittals:

1. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

C. Steel Reinforcement Shop Drawings: Prepared in accordance with ACI 315 including placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1. Shop drawings shall include plan, elevation, and detail views with project grids accurately indicating bar material type, size, lengths, locations, bends, lap splice lengths and locations, welded splice locations, mechanical coupler locations and headed bar locations.
2. Layering and sequencing information for intersections shall be identified.
3. Coordinate and include placement diagrams of embedded items such as anchor bolts, inserts, etc.
4. Shop drawings shall not include copies of Contract Document details. References to Contract Document details in lieu of details prepared as part of placing drawing submittals will not be accepted.
5. Shop drawings shall list the structural materials included in the submittal. Reinforcement shown on placing drawings illustrating sequencing, layering, or intersections, but not included in the placing drawing bar lists, shall be identified as “previously submitted” or “to be submitted.

D. Welding Documents: Welding Procedure Specifications (WPSs), Procedure Qualification Records (PQRs), and Welder Qualification Test Records (WQTRs) prepared in accordance with AWS D1.4 for each type of weld and position to be performed.

E. Mill Certificates: The Contractor shall submit mill certificates in accordance with ASTM designations referenced herein for each heat of reinforcement, mechanical couplers, and headed bars to the Owner’s Testing Agency for review.

F. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. General: Quality assurance tests and inspections shall be the responsibility of the Owner. The Owner shall retain a testing agency, referred to herein as the Owner’s Testing Agency, who shall perform the required tests and inspections, prepare written summary reports of tests and inspections and review submittals.

B. The Owner's Testing Agency shall inspect material, size, spacing, arrangement, placement, and cover of reinforcement.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel and D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than **25** percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from [**ASTM A 615/A 615M, Grade 60**] [**ASTM A 706/A 706M**], deformed bars, assembled with clips.

E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire or plastic according to CRSI's "Manual of Standard Practice," and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. Use precast concrete spacers of greater compressive strength than concrete at location in contact with ground.

C. Mechanical Couplers: Standard, transition, position, and half-couplers (form savers) for reinforcement bars shall be as follows. Swaged and wedged couplers shall not be used. Type II couplers may be used in lieu of Type I at the Contractor's option, provided that these couplers can be dimensionally accommodated in the reinforcing cage.

1. Type I couplers shall meet the requirements of the CBC.
2. Type II couplers shall meet the requirements of the CBC. Couplers shown on the drawings shall be Type II, unless otherwise shown or indicated.

2.3 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice" and in accordance to tolerances of ACI 315.

PART 3 - EXECUTION

3.1 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Stagger splices of adjacent bars, unless otherwise shown on the Drawings.

G. Stagger mechanical couplers of adjacent bars as shown on Drawings, but not less than 24 inches

3.2 FIELD QUALITY CONTROL

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

B. Inspections:

1. Steel reinforcement placement in accordance with tolerances of ACI 117.
2. Steel reinforcement welding:

    a. Review the WPSs, PQRs, WQTRs, and suitability of welding equipment.
    b. Inspect welding work, including surface preparation, preheat, welder technique and performance, equipment, weld lengths, and weld sizes for conformance with the WPSs.
    c. Perform visual inspection of fillet, flare-v-groove, and flare-bevel-groove welds of reinforcement bars to structural steel.
    d. Perform visual inspection and nondestructive testing of complete joint penetration (CJP) groove welds. Nondestructive testing shall be magnetic particle testing performed in accordance with ASTM E 709.
    e. For reinforcement bars welded to structural steel, verify surface preparation, required preheat, and filler metal type for the structural steel conforms to AWS D1.1 requirements.

3. Embeds, headed bolts and studs: Placement in accordance with Drawings and tolerances of ACI 117 or applicable trade standard for work to follow, whichever is more restrictive.

END OF SECTION

SECTION 03 35 09 – INTERIOR CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Surface preparation.
2. Application of clear, colorless, liquid concrete hardener and densifier on concrete slabs not being polished but will be exposed.
3. Application of water-based concrete enhancer.

B. Related requirements

1. Section 03 30 00 - Cast-in-Place Concrete.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation meeting: Prior to start of installation, arrange a preliminary meeting with trades associated with the work of this Section. Comply with Section 01 31 00.

B. Phasing:

1. Where feasible delay sealer application until installation of sealants is complete in joints adjoining surfaces to be coated.
2. Sealer work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, sealer, and sealant materials identical to those used in the Work.

C. Manufacturer inspections:

1. Obtain materials only from manufacturer who will send a qualified technical representative to the Project site before start of this work to verify substrate acceptability. Schedule subsequent visits as required thereafter to review installation procedures and completed work, and to issue warranty specified.
2. Unsatisfactory conditions disclosed by the manufacturer visits to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data of the proposed materials, including recommended coverage rates; include material test reports indicating and interpreting test results for compliance of water-repellent sealer with criteria specified.

B. Manufacturer certification:

1. Letter from the sealer manufacturer to verify its acceptance of the applicator, acceptance of substrates as satisfactory to receive the specified sealer, and affidavit that sealer is compatible with concrete curing agent used.
2. Duplicate copies of manufacturer affidavit with each shipment of materials delivered to the jobsite certifying that material furnished complies with specified requirements.

1.4 QUALITY ASSURANCE

A. Installer qualifications: Firm with a minimum of 3 consecutive years of experience in application of the sealer proposed for use, or similar sealers, on projects of similar size and scope, and licensed or approved in writing by the sealer manufacturer.
B. Sample panels: When requested by the sealer manufacturer, or necessary to adjust sealer formulation, provide sealer manufacturer with sufficient samples of substrate to be coated to determine exact formulation and coverage rates.
C. Coefficient of friction: Coefficient of friction of the sealed floors shall comply with ADA requirements for flat and sloped surfaces.

1.5 HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
C. Keep products from freezing.
D. Avoid direct contact with this product, as it may cause mild-to-moderate irritation of the eyes and/or skin.
E. Protect materials during handling and application to prevent damage or contamination.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply concrete densifier and chemical hardener when concrete temperature is below 40-degree F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. ProSoCo, (basis of design).
B. Harris Specialty Chemicals, Inc. (Hydrozo).
C. L&M Construction Chemicals, Inc.
D. Pecora Corp.
E. Sivento.
F. Or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Slip Resistance: Meet the dynamic coefficient of friction prescribed by ADAAG of at least 0.42 or greater per 2012 ANSI A137.1. This will be accepted as meeting the intent of slip resistance requirements for CBC 11B-302 and ADA Standards 4.5.1.

2.3 DENSIFYING SEALER

A. Basis of design is “Consolideck” LS/CS by ProSoCo, or equal by one of the manufacturers listed above, with the following properties:

1. Form: Clear, water-like liquid.
2. Specific gravity: 1.05.
3. pH: 11.0.
4. Wt/Gal: 8.6 lbs.
5. Active content: 6 percent.
6. Total solids: 6 percent.

7. VOC content: Less than 20 g/L.

2.4 DENSIFYING SEALER PERFORMANCE REQUIREMENTS

A. Provide sealer with the following properties based on testing manufacturer standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.

1. Abrasion resistance:

a. 46 percent improvement, Taber Abrasion testing H22 Wheel, 1000-gram load.
b. Average weight loss 0.174 grams, micro abrasion resistance testing, ASTM C 418 Abrasion Resistance of Concrete.

2. Slip Resistance: Steel troweled concrete – static coefficient of friction 0.6615 dry, 0.6059 wet, ASTM C 1028.
3. Water vapor transmission: 100 percent retained, ASTM E 96.
4. Water absorption Tube Test, 60 mph effectiveness.
5. Adhesion strength: 444 Psi, ASTM D 4541, Pull-Off of Coatings Using Type II Tester.
6. Stain resistance: 79 percent (24-hour duration for steel troweled concrete.)
7. Appearance: When compared visually to an untreated sample under same lighting conditions, the sealer shall not change the color and sheen of the coated substrate and shall be invisible after application and over the life of the building.

2.5 MISCELLANEOUS MATERIALS

A. Maintenance and cleaning materials: ProSoCo Klean Super Concentrate: Concentrated maintenance cleaner for concrete floors containing lithium silicate, with the following properties:

1. Form: Clear liquid, soapy odor.
2. Specific gravity: 1.00.
3. pH: 9.87.
4. Flash point: ASTM D 3278, more than 200 degrees F.
5. VOC content: Maximum 4 percent.

B. Water: Clean, potable and free of minerals.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain the services of a factory-authorized technical service representative, from the sealer manufacturer, to inspect and approve the substrates before application and to instruct the applicator on the products and application methods to be used.
B. Verify that slabs to be treated are clean, dry and free of dust, dirt, oil, grease and other foreign material that would affect the application and performance of the specified materials.
C. Correct detrimental conditions before proceeding with installation.

3.2 PROTECTING

A. Protect adjacent work, including sealant bond surfaces, from spillage or blow-over of the sealer.

3.3 APPLICATION

A. Test application:

1. Before performing this work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application.
2. Proceed with work only after Architect review of test application.

B. General: Sealer shall be applied by manufacturer-approved applicators using recommended methods and equipment. Do not exceed the application rates recommended by the manufacturer.
C. Densifying sealer: (Consolidek LS/CS Guard):

1. Uniformly spread the product in accordance with its manufacturer's instructions. Do not allow product to dry prior to spreading.
2. Allow to dry completely before allowing traffic on the treated surfaces. Match approved sample panel.

3.4 TOLERANCES

A. Gloss range: Within 20 – 40, level.
B. Hardness: Not less than 5.5.
C. Slip resistance: Meet ADA requirements.

3.5 CLEANING

A. Clean spilled materials from adjacent surfaces immediately after spillage.
B. Comply with manufacturer's recommendations for cleaning.

END OF SECTION

SECTION 03 35 43 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sealing and polishing exposed surfaces of the interior concrete floors (CONC-2).
B. Related requirements:

1. Section 03 30 00 for cast-in-place concrete requirements.
2. Section 03 35 09 for sealed structural concrete floors.
3. Section 03 54 16 for self-leveling concrete.

1.2 DEFINITIONS

A. Level 1: Matte finish, 100 grit.
B. Level 2: Low sheen, 400 grit.
C. Level 3: High sheen, 800 grit.
D. Level 4: Gloss shine, 3000 grit

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to start of installation arrange a pre-installation meeting between the sealer manufacturer, the applicator/polisher, and related trades whose work will be in contact with the treated surfaces, including but not limited to those for joint sealers.
2. Record minutes of the meeting, file in the Project file, and send a copy to the Architect.

B. Phasing:

1. Where feasible delay sealer application until installation of sealants is complete in joints adjoining surfaces to be sealed and polished.
2. Sealer work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, sealer, and sealant materials identical to those used in the Work.

1.4 SUBMITTALS

A. Data: Manufacturer Product Data of the proposed sealer and polish, and recommended coverage rates. Include material test reports indicating and interpreting test results for compliance of sealer and polish with criteria specified.
B. Samples for Initial Selection: For each type of concrete showing different levels of polishing for selection. Include 12-inch x 12-inch samples for Level 1, Level 2, Level 3 and Level 4 finishes.
C. Manufacturer certification:

1. Letter from the sealer and polish manufacturer to verify acceptance of the applicator, acceptance of substrates as satisfactory to receive the specified sealer and polish, and affidavit that sealer is compatible with concrete curing agent used.

2. Duplicate copies of manufacturer affidavit with each shipment of materials delivered to the jobsite certifying that materials furnished comply with specified requirements.

1.5 QUALITY ASSURANCE

A. Installer qualifications: Firm with a minimum of 3 consecutive years of experience in application of the sealer and polish proposed for use, or similar products, on projects of similar size and scope, and licensed or approved in writing by the sealer manufacturer.

B. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Architect reserves the right to require a higher or lower level of polish of the concrete based on review of mockups at no additional cost. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Architect and manufacturer's representative are to be present to approve steps.
2. Provide mock up for each finish specified.
3. Review manufacturer's product data sheets to determine the suitability of each product for the specified surface.
4. Apply each concrete surface treatment to determine as specified in the number of steps, coverage rate to be determined, compatibility, effectiveness, surface preparation, application procedures and desired results.
5. Each mockup shall be a minimum of 64 square feet in location designated Architect. Provide 3 mockups of each finish. Each mockup shall be reviewed for following criteria:
    a. Gloss.
    b. Hardness.
    c. Slip Resistance.
    d. See specified performance criteria.
6. Do not proceed with remaining work until written approval of Architect is received.
7. Maintain approved mockup during construction in an undisturbed condition standard for judging the complete work.
8. Remove and dispose of mockups not approved by the Architect.

C. Sample panels: When requested by the sealer manufacturer, or necessary to adjust sealer and polish formulation, provide sealer manufacturer with sufficient samples of substrate to be coated and polished to determine exact formulations and coverage rates, and to achieve desired sheen.

D. Manufacturer inspections:

1. Obtain materials only from manufacturer who will send a qualified technical representative to the Project site before start of this work to verify substrate acceptability. Schedule subsequent visits as required thereafter to review installation procedures and completed work, and to issue warranty specified.
2. Unsatisfactory conditions disclosed by the manufacturer visits to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.

E. Pre-installation testing:

1. Test sample panel in accordance with ASTM E 514, modified for field use.
2. Report results of tests and apply additional materials, when appearance is unchanged, or re-formulate and re-apply sealer, when test results are not satisfactory.

1.6 PROJECT CONDITIONS

A. Floor Flatness per ASTM E 1155:

1. Concrete must have an average Floor Flatness [F(F)] rating of at least 50 with a minimum local flatness value of 35.
2. Concrete must have an average Floor Levelness [F(L)] rating of at least 30 with a minimum local level value of 20.

B. Comply with manufacturer’s recommendations regarding environmental requirements, and temperature and conditions of surfaces to receive sealer.

1. Do not apply under windy conditions such that the concrete surface treatment may be blown to surfaces not intended.
2. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
3. Temporary Lighting: Minimum 200 W light source, placed 8 feet above horizontal concrete surface, for each 425 square feet of concrete being finished.
4. Temporary Heat: Ambient temperature of 50 degrees F minimum.
5. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

1.7 SPECIAL WARRANTY

A. Warrant sealer and polish against water penetration through treated surfaces, peeling, cracking, discoloration and other defects of the applied materials caused by faulty materials and workmanship, for 5 years after Substantial Completion.
B. The warranty shall include repair of defects and failures in the sealer and polish during the warranty period, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 SEALER/MANUFACTURER

A. Basis of design is “Consolidek LS” followed by" Consolidek LS Guard," both by ProSoCo.
B. Other acceptable manufacturers, if approved by the Architect:

1. Solomon Colors
2. L&M Construction Chemicals, Inc.
3. WR Meadows.

2.2 PERFORMANCE REQUIREMENTS

A. Provide sealer with the following properties based on testing manufacturer standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.

1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens for hardened concrete: ASTM C 642.
2. Water-vapor transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, ASTM E 96.

3. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, ASTM G 53.
4. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, ASTM D 1653.

B. Appearance: When compared visually to an untreated sample under same lighting conditions, the sealer shall not change the color and sheen of the coated substrate and shall be invisible after application and over the life of the building.
C. Polishing of slabs (CONC-2):

1. Appearance Chart: Level 3 finish (polished), as accepted by Architect.
2. Aggregate Exposure Chart: Class B (Fine Aggregate), as accepted by Architect.

A. ADA Coefficient of Friction: Meet dynamic coefficient of friction prescribed by ADAAG –of at least 0.42 or greater per 2012 ANSI A137.1 will be accepted as meeting the intent of slip resistance; CBC 1124B.1 and ADA Standards 4.5.1.
B. Degree of Reflectiveness: Averages meeting Gloss Levels between 20 - 40 as tested in accordance with ASTM E 430.
C. Degree of Hardness: Exceeding 5.5 tested in accordance with ASTM D 3363.
D. Independent Testing lab is to be selected to conduct tests on mockups and at completion of project.

2.3 FLOOR PROTECTION

A. Pressed wool felt: SAE Standards F-3; ASTM 16 R3 :

1. Nominal thickness: 1/4-inch.
2. Width: 60-inches.

B. MDF Board: Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain the services of a factory-authorized technical service representative, from the sealer manufacturer, to inspect and approve the substrates before application and to instruct the applicator on the product and application method to be used.
B. Verify that slabs to be sealed are clean, dry and free of dust, dirt, oil, grease and other foreign material that would affect the application and performance of the sealer.
C. Verify that the slabs to be polished meet the tolerance requirements of 03 30 00 prior to commencing work.
D. Correct detrimental conditions before proceeding with installation.

3.2 PROTECTING

A. Protect adjacent work, including sealant bond surfaces, from spillage or blow-over of sealer.

3.3 APPLICATION

A. Test application:

1. Before performing this work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application.
2. Proceed with work only after Architect review of test application.

B. Sealer shall be applied by manufacturer-approved applicators using recommended methods and equipment. Do not exceed the application rate recommended by the manufacturer.
C. Topcoat (LS Guard):

1. Uniformly spread the product in a thin layer using a microfiber pad pre-moistened with sealer prior to use. Do not allow product to dry prior to spreading.
2. Allow to dry tack free (20 to 60 minutes).
3. Once dry, burnish to a high gloss finish using high-speed burnishing equipment and a high-speed burnishing pad designed for use on a high-gloss finish. Additional coats may be applied and burnished depending upon concrete porosity and desired finish.

D. Control Joints: Sawcut control joints as indicated on drawings.

3.4 FIELD QUALITY CONTROL

A. Employ a testing agency acceptable to the Owner to test the in-place sealer in compliance with standards specified.
B. In the event test shows that the sealer is deficient, apply additional sealer.
C. Repetition of the above procedure on all previously treated surfaces will be at Contractor's expense.

3.5 CLEANING

A. Clean sealer from adjacent surfaces immediately after spillage.
B. Comply with manufacturer’s recommendations for cleaning.

3.6 PROTECTION

A. After acceptance of polishing: protect the final product until Substantial Completion minimally as follows:

1. Apply one layer of 1/4-inch thick pressed wool felt directly over the polished floor.
2. Cover felt with 1/2-inch MDF board.
3. Cover MDF board with one additional layer of 1/4-inch thick pressed wool.

END OF SECTION

SECTION 03 54 16 - SELF-LEVELING CEMENTITIOUS UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-leveling cementitious underlayment where monolithic concrete floor slabs to be covered by a finish material do not comply with the tolerances specified either in Section 03 30 00 or the Sections where the floor finishes are specified.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for product proposed for use.
B. Tests: Test results as specified below.

1.3 QUALITY ASSURANCE

A. Installer qualifications: Licensed and approved in writing by the underlayment manufacturer.
B. Sample panel:

1. Provide, on a floor slab at the job site, a 10-foot square Sample panel of the cementitious underlayment to demonstrate texture of finish surface and test levelness of finish assembly.
2. Make such modifications as necessary to achieve a Sample panel satisfactory to the Architect or remove and construct additional Sample panel(s).
3. Approved Sample panel may remain in place shall serve as the standard for the same work on the building.

1.4 HANDLING

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

1.5 JOB CONDITIONS

A. Do not place underlayment when the floor is covered with standing water or if surface temperature is 50 degrees or below.
B. Follow these Specifications and the self-leveling underlayment manufacturer's instructions for placing, finishing, curing and protecting self-leveling underlayment when the conditions require hot weather installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER/MATERIALS

A. Ardex, Inc., Ardex K-15” (basis of design.)
B. Atlas Tech Products “Tech-Level Premier.”
C. Mapei “UltraPLan 1.”

D. Dayton “Levelayer 1.”
E. Tec Specialties “Level Set 300.”

2.2 MATERIALS

A. Cementitious material: Ardex K-15, with total binder of 80 percent cement binder per ASTM C 114.
B. Aggregate: Well-grade, washed gravel for use when underlayment is installed thicker than 1-1/2 inch.
C. Water: Fresh, potable and not warmer than 70 degrees F.
D. Primer: Ardex P-51.
E. Feather edge skim finish: Ardex “Feather Finish.”

2.3 MIX DESIGN

A. As recommended by the underlayment manufacturer’s instructions to obtain a homogenous concrete mass that will flow freely, self-level and screed to a smooth, even surface within the tolerance specified, and shall meet the following:

1. Minimum compressive strength: 4,000 psi at 28-day when tested in accordance with ASTM C 109 MOD.
2. Minimum flexural strength: 1,000 psi at 20-day when tested in accordance with ASTM C 348.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Verify conditions affecting the work of this Section at the site.
B. Correct detrimental conditions before proceeding with installation.
C. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

D. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

1. Moisture Testing: Perform tests so that each test area does not exceed [200 sq. ft. (18.6 sq. m)] [1000 sq. ft. (304.8 sq. m)] <Insert area>, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of [3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m)] <Insert value> in 24 hours.
    b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum [85] <Insert number> percent relative humidity level measurement, or as recommended by hydraulic cement underlayment manufacturer.

A. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.

1. Install underlayment reinforcement recommended in writing by manufacturer.

3.2 PLACEMENT

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Prime subfloor leaving no bare spots.
C. Install screeds as recommended by manufacturer and as required to meet tolerance specified below. Set screeds with a laser level.

1. Set screeds so that the minimum thickness of underlayment will be at least 1/8 inch.
2. Where underlayment covers only a small area, grind, chisel and undercut slab, if required, so that the minimum thickness will not be less than 1/8 inch.

D. Place the underlayment in accordance with its manufacturer's instructions in one continuous operation without cold joints. Screed to required level suitable to receive finish flooring materials.
E. Finish underlayment so that it contacts a 10-foot straightedge with a tolerance not exceeding the following at any location:

1. One-sixteen inch under wood flooring.
2. One-eight inch elsewhere.

3.3 PROTECTING/PATCHING

A. Do not permit traffic on the underlayment until it has developed sufficient strength to withstand traffic without damage (minimum of 24 hours).
B. Patch damaged surfaces flush with adjacent areas in accordance with manufacturer's recommendations.

3.4 FIELD QUALITY CONTROL

A. The Contractor shall have 2-inch cubes tested by a reputable and recognized testing laboratory, in accordance with ASTM C 109 MOD., to determine compliance with compressive strength specified.

END OF SECTION

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DIVISION 04
MASONRY

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SECTION 04 01 20 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Providing and installing new brick to match the existing brick. Repairing brick masonry.
2. Removing abandoned anchors.
3. Installing new accessories.
4. Painting steel uncovered during the work.

1.2 DEFINITIONS

A. Low-Pressure Spray: [**100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s)**] <**Insert range of values**>.

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to brick masonry repair including, but not limited to, the following:

a. Verify brick masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.
e. <**Insert agenda items**>.

1.4 SEQUENCING AND SCHEDULING

A. Order sand[**and gray portland cement**] for colored mortar immediately after approval of [**Samples**] [**mockups**]. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Brick Masonry Repointing."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of replacement bricks on the structure, showing relation of existing and new or relocated units.
2. Show provisions for expansion joints or other sealant joints.
3. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
4. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches (150 mm) long by [**1/4 inch (6 mm)**] [**1/2 inch (13 mm)**] wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least [**three**] [**six**] <**Insert number**> Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.

3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.

    a. Have each set contain a close color range of at least [**three**] [**six**] <**Insert number**> Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.

4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.

2. Each type of patching compound in the form of briquettes, at least 3 inches (75 mm) long by 1-1/2 inches (38 mm) wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
3. Accessories: Each type of accessory and miscellaneous support.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For [**brick masonry repair specialist**] [**including field supervisors and workers**] [**and**] [**testing service**].

B. Preconstruction Test Reports: For [**existing bricks and mortar**] [**and**] [**replacement bricks**].

C. Quality-control program.

1.7 QUALITY ASSURANCE

A. Brick Masonry Repair Specialist Qualifications: Engage an experienced brick masonry repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repair work.

1. Field Supervision: Brick masonry repair specialist firm shall maintain experienced full-time supervisors on Project site during times that brick masonry repair work is in progress.

2. Brick Masonry Repair Worker Qualifications: [**When bricks are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products**] <**Insert requirement**>.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches (1200 mm) in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

   a. Replacement: [**Four**] <**Insert number**> brick units replaced.
   b. Patching: Three small holes [**at least 1 inch (25 mm) in diameter**] [**as directed**] <**Insert size**> for each type of brick indicated to be patched.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: [**Owner will engage**] [**Engage**] a qualified testing agency to perform preconstruction testing on brick masonry as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Replacement Brick: Test each proposed type of replacement brick according to sampling and testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).

3. Existing Brick: Test each type of existing brick indicated for replacement according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove [**five**] <**Insert number**> existing units from locations designated by Architect. Take testing samples from these units.
4. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.
B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
E. Store sand where grading and other required characteristics can be maintained and contamination avoided.
F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F (4 and 49 deg C).
2. When mean daily air temperature is below 40 deg F (4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above unless otherwise indicated.
E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Face Brick: As required to complete brick masonry repair work.

1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties [**within 10 percent of those determined from preconstruction testing of selected existing units.**] [**as listed below:**]

a. Physical Properties: According to ASTM C67 and as follows:

1) Compressive Strength: <**Insert requirement**>.
2) 24-Hour Cold-Water Submersion Absorption: <**Insert requirement**>.
3) Five-Hour Boil Absorption: <**Insert requirement**>.
4) Saturation Coefficient: <**Insert requirement**>.
5) Initial Rate of Absorption: <**Insert requirement**>.

b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2. Brick Matching Architect's Sample: Units with colors, color variation within units, surface texture, and physical properties that match Architect's sample. Match existing units in size and shape.

a. Physical Properties: According to ASTM C67 and as follows:

1) Compressive Strength: <**Insert requirement**>.
2) 24-Hour Cold-Water Submersion Absorption: <**Insert requirement**>.
3) Five-Hour Boil Absorption: <**Insert requirement**>.
4) Saturation Coefficient: <**Insert requirement**>.
5) Initial Rate of Absorption: <**Insert requirement**>.

b. For Architect's sample that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range rather than brick that matches an individual color within that range.

3. Special Shapes:

a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are unacceptable procedures for fabricating special shapes.

4. Tolerances as Fabricated: [**According to tolerance requirements in ASTM C216, Type FBX**] [**According to tolerance requirements in ASTM C216, Type FBS**] <**Insert requirement**>.

B. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW where in contact with earth.

2. [**Grade SW or MW**] [**Grade SW, MW, or NW**] for concealed backup.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; white[**or gray, or both**] where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.
C. Masonry Cement: ASTM C91/C91M.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

D. Mortar Cement: ASTM C1329/C1329M.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

E. Mortar Sand: ASTM C144.

1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

G. Water: Potable.

2.4 MANUFACTURED REPAIR MATERIALS

A. Brick Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching brick masonry.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Use formulation that is vapor and water permeable (equal to or more than the brick), exhibits low shrinkage, has lower modulus of elasticity than bricks being repaired, and develops high bond strength to all types of masonry.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound in colors and textures to match each brick being patched. Provide [**sufficient number of**] [**no fewer than three**] <**Insert number**> colors to enable matching of the color, texture, and variation of each unit.

2.5 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.
B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to [**MPI #23 (surface-tolerant, anticorrosive metal primer)**] [**or**] [**SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating**] <**Insert requirement**>.

1. Surface Preparation: Use coating requiring no better than [**SSPC-SP 2, "Hand Tool Cleaning"**] [**SSPC-SP 3, "Power Tool Cleaning"**] [**or**] [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning"**] <**Insert surface preparation standard**> surface preparation according to manufacturer's literature or certified statement.

2. VOC Limit: Use coating with a VOC content of [**400 g/L (3.3 lb/gal.)**] <**Insert value**> or less.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.6 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Rebuilding (Setting) Mortar by Volume: ASTM C270, Proportion Specification, [**1 part portland cement, 1 part lime, and 6 parts sand**] <**Insert proportions**>.
2. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, [**Type N**] <**Insert Type**> unless otherwise indicated; with cementitious material limited to [**portland cement and lime**] [**masonry cement**] [**or**] [**mortar cement**].

3. Rebuilding (Setting) Mortar by Property: ASTM C270, Property Specification, [**Type N**] <**Insert Type**> unless otherwise indicated; with cementitious material limited to [**portland cement and lime**] [**masonry cement**] [**or**] [**mortar cement**].

4. Pigmented, Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 REPAIR SPECIALIST

A. Brick Masonry Repair Specialist Firms: Subject to compliance with requirements, [**have masonry repair performed by one of the following**] [**firms that may perform masonry repair include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, names of masonry repair specialist firms**>.

3.2 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove[**gutters and**] downspouts and associated hardware adjacent to masonry and store during masonry repair. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.3 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from [**20 feet (6 m)**] [**50 feet (15 m)**] <**Insert distance**> away by Architect.

3.4 ABANDONED ANCHOR REMOVAL <**INSERT DRAWING DESIGNATION**>

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items [**no longer in use unless indicated to remain**] [**indicated to be removed**].

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

    a. Cut or grind off item approximately [**3/4 inch (20 mm)**] <**Insert dimension**> beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
    b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace bricks.

3.5 BRICK REMOVAL AND REPLACEMENT <**INSERT DRAWING DESIGNATION**>

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated[**or are to be reused**]. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.[**Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.**]

D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. 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.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.

G. Replace removed damaged brick with other removed brick in good condition, where possible, [**or with new brick**]matching existing brick. Do not use broken units unless they can be cut to usable size.

H. 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.

I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 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 according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.6 PAINTING STEEL UNCOVERED DURING THE WORK <**INSERT DRAWING DESIGNATION**>

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to [**SSPC-SP 2, "Hand Tool Cleaning"**] [**SSPC-SP 3, "Power Tool Cleaning"**] [**or**] [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning"**] <**Insert surface preparation standard**>, as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than [**1/16 inch (1.6 mm)**] <**Insert dimension**>, notify Architect before proceeding.

3.7 BRICK MASONRY PATCHING <**INSERT DRAWING DESIGNATION**>

A. Patch the following bricks unless another type of repair or replacement is indicated:

1. Bricks indicated to be patched.
2. Bricks with holes.
3. Bricks with chipped edges or corners.[**Patch chipped edges or corners measuring more than 3/4 inch (19 mm) in least dimension.**]
4. Bricks with small areas of deep deterioration.[**Patch deep deteriorations measuring more than 3/4 inch (19 mm) in least dimension and more than 1/4 inch (6 mm) deep.**]

B. Remove and replace existing patches [**where indicated**] [**unless otherwise indicated or approved by Architect**].

C. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least [**1/4 inch (6 mm)**] <**Insert dimension**> thick, but not less than recommended in writing by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
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 in writing 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 brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
8. Keep each layer damp for 72 hours or until patching compound has set.

9. Remove and replace patches with hairline cracks or that show separation from brick at edges, and those that do not match adjoining brick in color or texture.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.
C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
D. Remove masking materials, leaving no residues that could trap dirt.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
C. Notify [**inspectors**] [**and**] [**Architect's Project representatives**] in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until [**inspectors**] [**and**] [**Architect's Project representatives**] have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.10 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.
B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION 040120.63

DIVISION 05
METALS

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

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. Structural steel.
2. Grout for base plates.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 03 Section, “Cast in Place Concrete” for base plate grouting
3. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
4. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
5. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
6. Division 05 Section "Metal Stairs."
7. [**Division 09 painting Sections**] [**and**] [**Division 09 Section "High-Performance Coatings"**] for surface-preparation and priming requirements.

C. Reference:

1. **CBC - 2022 California Building Code**
2. AISC - American Institute of Steel Construction:
   a. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges, except as follows:
      1) Horizontal and vertical dimensions may not be shown entirely on the Structural Drawings.
      2) Division 1 requirements and those specified herein shall govern in case of conflict.
   b. ANSI/AISC 341 - Seismic Provisions for Structural Steel Buildings.
   c. ANSI/AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.
   d. ANSI/AISC 360 - Specification for Structural Steel Buildings.
   e. AISC - Steel Construction Manual

3. RCSC – Research Council on Structural Connections “Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.”
4. AWS - American Welding Society’s

    a. AWS D1.1 - Structural Welding Code - Steel.
    b. AWS D1.8 - Structural Welding Code - Seismic Supplement.

5. SSPC - Steel Structures Painting Council, designations referenced herein.
6. [**ICC Evaluation Service - Provide “Evaluation Report” for product where specified herein.**]
7. ASTM, American Society for Testing and Materials, designations referenced herein.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 SUBMITTALS

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

B. LEED Submittal:

1. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

C. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds. Specifically reference WPS used in performance of each demand critical weld.

D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing. Welding procedures and qualifications shall be prepared by a welding professional experienced in the welding technologies and processes proposed. Include the following:

1. Power source (constant current or constant voltage).
2. Electrode classification, manufacturer and trade name.
3. Indicate shop or field application
4. All parameter and variable settings
5. Preheat/postheat or post-weld treatment

E. Qualification Data: For qualified Installer, fabricator, welding engineer and testing agency for weld and welder qualification.

F. Welding certificates for shop and field welders.

G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

H. Mill test reports for structural steel, including chemical and physical properties.

I. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.
7. <**Insert product**>.

J. Source quality-control reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category [**ACSE**] [**CSE**].

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement [**P1**] [**P2**] [**P3**] or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Preinstallation Conference: Conduct conference at **Project site**. The contractor shall arrange and sponsor one preconstruction conference, following approval of project WPSs and prior to start of field welding operations. At a minimum, the Contractor, Contractor's Welding Quality Control Inspector, the Contractor's Welding Foreman, the Owner's Testing Agency, the Jurisdictional Building Inspector (at their option) and the Engineer of Record or representative shall attend. Attendees shall review the approved Welding Procedure Specifications (WPS) and other special welding requirements for the project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:

1. W-Shapes: 60 percent.
2. Channels, Angles-Shapes: 60 percent.
3. Plate and Bar: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles-Shapes: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

F. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

G. Steel Forgings: ASTM A 668/A 668M.

H. Welding Electrodes: Conform to requirements of AWS D1.1 and D1.8. Filler metals shall be low hydrogen types and shall be as recommended by the manufacturer for the position, thickness and other conditions of use.

1. Filler Metal Toughness:

a. Filler metals for shop and field welded joints designated as SLRS on the Drawings shall have a minimum Charpy V-Notch (CVN) toughness of 20 ft-lb at 0 degrees Fahrenheit as determined by AWS A5 classification test method or manufacturer certification.
b. Filler metals for shop and field welded joints designated as demand critical welds on the Drawings shall have a minimum Charpy V-Notch (CVN) toughness of 20 ft-lb at -20 degrees Fahrenheit as determined by the appropriate AWS classification test method or manufacturer certification and 40 ft-lb at 70 degrees Fahrenheit as determined by ANSI/AISC 341, Appendix X or other approved method.

2. Arc-welding equipment: Welding equipment shall have calibrated meters for voltage and amperage that accurately indicate these values at the point of welding for the length of cable to be used. Contractor shall demonstrate to the satisfaction of the Owner’s Testing Agency the accuracy of the meters, using external meters attached to extension cables of a length that reflects actual project conditions. If equipment meters do not accurately reflect the electrical properties at the point of welding, the Contractor shall provide external meters.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts[**or tension-control, bolt-nut-washer assemblies with splined ends**]; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers, shall be permitted at pretensioned bolt locations, except at [**AESS**], slip critical bolted connections and where noted on the Drawings

1. Finish: [**Plain**] [**Mechanically deposited zinc coating**].

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: [ASTM F 1554, Grade 36] [ASTM F 1554, Grade 55, weldable] [ASTM A 354, Grade BD] [ASTM A 449] [ASTM A 572/A 572M, Grade **50**] [ASTM A 36/A 36M].

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Plain.

G. Threaded Rods: [ASTM A 36/A 36M] [ASTM A 193/A 193M, Grade B7] [ASTM A 354, Grade BD] [ASTM A 449] [A 572/A 572M, Grade **50**].

1. Nuts: ASTM A 563 [**heavy-**]hex carbon steel.
2. Washers: [**ASTM F 436, Type 1, hardened**] [**ASTM A 36/A 36M**] carbon steel.
3. Finish: [**Plain**] [**Hot-dip zinc coating, ASTM A 153/A 153M, Class C**] [**Mechanically deposited zinc coating, ASTM B 695, Class 50**].

H. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

I. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Primer: Rust-inhibitive shop primer that is Volatile Organic Compounds (V.O.C.) compliant.

1. See Division 09 painting Sections and Division 09 Section "High-Performance Coatings" for surface-preparation and priming requirements for architectural finishes on structural steel.

B. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to fluid consistency and a 30-minute working time.

1. Grout 28-day compressive strength: [**f'c=5000psi, minimum**]

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill,or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Provide as follows:

1. Clean and prepare all steel according to SSPC-SP 1, "Solvent Cleaning to remove oil and grease.
2. Clean and prepare steel surfaces that are to remain unpainted according SSPC-SP 2, "Hand Tool Cleaning" after fabrication.
3. Provide SSPC-SP3, "Power Tool Cleaning" for steel to be shop primed, after fabrication.

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Drill or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Drill or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: [**Pretensioned**] [**or Slip Critical, as indicated**].

a. Faying Surfaces: Provide Class A surfaces for connections of structural steel using slip-critical bolts. Provide Class C surfaces for connections of hot-dip galvanized steel using slip-critical bolts

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 3 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize all elements permanently exposed to weather [**and as indicated**].

3. Use Type 3 steel at all elements permanently exposed to weather where galvanization is not permitted by the relevant ASTM material specification.

2.9 SOURCE QUALITY CONTROL

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

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections. The Contractor shall notify the Owner’s Testing Agency of work to be tested and inspected. Notification shall be sufficiently in advance to allow scheduling of tests and inspections, but not less than 24 hours.
2. The Owner’s Testing Agency shall perform tests and inspections per CBC, Chapter 17 and as follows:

    a. Collect and review certified mill analysis reports.
    b. Review steel identification per CBC Section 2203.2. Material that cannot be identified or has a questionable source shall be tested by the Contractor’s Testing Agency.
    c. Collect and review certificates of conformance. Materials not accompanied by manufacturer certificates shall be tested by the Contractor’s Testing Agency.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" and as follows:

1. Sample and test high strength bolts, nuts and washers in accordance with the requirements of the Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
2. Inspect installation of high strength bolts per ANSI/AISC 341, Chapter J, Section J7.

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures:

1. Personnel performing welding inspections and nondestructive testing on SLRS and for demand critical welds shall meet the additional qualifications specified in AWS D1.8, Section 7
2. Review shop WPS in accordance with AWS D1.1 and D1.8.
3. Confirm welders, welding foreman, and QC Inspectors have a copy of the approved WPS.
4. Review WPQR in accordance with AWS D1.1 and D1.8 for the welds to be performed.
5. Confirm welding equipment settings, and voltage and amperage at point of welding.

6. Perform nondestructive tests (NDT) of field welds in accordance with ANSI/AISC 341, Chapter J, Section J6, except as noted below. Provide NDT equipment as required to perform specified tests.

    a. Liquid Penetrant Inspection: ASTM E 165.
    b. Magnetic Particle Inspection: Magnetic Particle (MP) testing shall conform to AWS D1.8, Section 7.9.

        1) The rate of magnetic particle testing on CJP groove welds may be reduced to 10-percent for an individual welder or welding operator after sufficient project experience is demonstrated per Chapter J, subsection J6.2h. However, no reduction in testing frequency shall be permitted for demand critical welds.

    c. Ultrasonic Inspection: Ultrasonic testing (UT) shall conform to AWS D1.8, Section 7.10.

        1) The rate of ultrasonic testing on complete joint penetration (CJP) groove welds may be reduced to 25-percent for an individual welder or welding operator after sufficient project experience is demonstrated per Chapter J, subsection J6.2g. However, no reduction in testing frequency shall be permitted for demand critical welds.

    d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.

3. [**Snug-tighten**] [**Pretension**] anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before placing grout.
4. Promptly place grout between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: [**Pretensioned**] [**or Slip Critical, as indicated**].

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Sample and test high strength bolts, nuts and washers in accordance with the requirements of the Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
2. Inspect installation of high strength bolts per ANSI/AISC 341, Chapter J, Section J7.

C. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures:

1. Personnel performing welding inspections and nondestructive testing on SLRS and demand critical welds shall meet the additional qualifications specified in AWS D1.8, Section 7.
2. Review field WPS in accordance with AWS D1.1 and D1.8.
3. Confirm welders, welding foreman, and QC Inspectors have a copy of the approved WPS.
4. Review WPQR in accordance with AWS D1.1 and D1.8 for the welds to be performed.
5. Confirm welding equipment settings, and voltage and amperage at point of welding.
6. Perform nondestructive tests (NDT) of field welds in accordance with ANSI/AISC 341, Chapter J, Section J6, except as noted below. Provide NDT equipment as required to perform specified tests

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: Magnetic Particle (MP) testing shall conform to AWS D1.8, Section 7.9.

1) The rate of magnetic particle testing on CJP groove welds may be reduced to 25-percent for an individual welder or welding operator after sufficient project experience is demonstrated per Chapter J, subsection J6.2h. However, no reduction in testing frequency shall be permitted for demand critical welds.

c. Ultrasonic Inspection: Ultrasonic testing (UT) shall conform to AWS D1.8, Section 7.10.

1) The rate of ultrasonic testing on complete joint penetration (CJP) groove welds may be reduced to 50-percent for an individual welder or welding

operator after sufficient project experience is demonstrated per Chapter J, subsection J6.2g. However, no reduction in testing frequency shall be permitted for demand critical welds. .

d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal fabrications not classified as "structural steel", and not specified in other Sections.
B. Related requirements:

1. Division 03 for grouting and dry-packing other than required for the work of this Section.
2. Division 09 for light-gage metal framing (studs, channels, etc.) for support of plaster and gypsum board, and backing plates for surface-applied items fastened to these materials.
3. Division 05 for the following:

    a. Steel stairs and railings attached thereto.
    b. Architectural metal fabrications.

4. Division 09 for finish painting metal fabrications.

C. Work furnished but installed in Division 03: Cast metal nosings.
D. Work installed but furnished in Division 32: Gate hardware.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing: Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not comply with structural performance requirements.

1.3 SUBMITTALS

A. Data:

1. Specifications and installation instructions for manufactured items.
2. Manufacturer's literature, including engineering data for anchors.

B. Shop Drawings:

1. Large scale, dimensioned Shop Drawings of metal fabrications indicating in detail methods of fabrication and assembly, weight, materials, holes, lugs, inserts, finishes and other pertinent data.
2. For components to be embedded in concrete and masonry work, furnish templates supplemented by dimensioned Shop Drawings to trades placing those components in their work. Assist in location of these components where so requested by those trades.

C. Samples: The following Samples, at least 6 inches long.

1. Welded connection between the following components showing proposed weld quality and finish.

    a. Pipe to pipe (railing).
    b. Pipe to bar.
    c. Tube to tube.
    d. Tube and bar.

2. Stair nosing.

1.4 QUALITY ASSURANCE

A. Qualifications for welding work:

1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements of AWS D1.1.
2. Examine that welders to be employed in this work have satisfactorily passed AWS qualification tests.
3. If recertification of welders is required, retesting shall be Contractor's responsibility.
4. Submit certificates of compliance to demonstrate compliance with the above requirement.
5. Costs for fabricator tests, inspections and quality control shall be borne by the Contractor.

B. Special inspections:

1. Except where otherwise specified, special inspections by Owner’s testing laboratory, prescribed by Code, will not be required where work is performed on the premises of a licensed fabricator, registered and approved by authorities having jurisdiction to perform such work without special inspection.
2. Submit certificates of compliance to demonstrate compliance with the above requirement.
3. Costs for fabricator tests, inspections and quality control shall be borne by Contractor.

1.5 HANDLING

A. Store metal fabrications above ground, under cover.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal surfaces - general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and absence of surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
B. Steel plates, shapes, and bars: ASTM A 36.
C. Steel tubing:

1. Cold-formed steel tubing: ASTM A 500, Grade A or B, as required for design loading, unless otherwise indicated.
2. Hot-formed steel tubing: ASTM A 501. For exterior installations and where otherwise specified, provide tubing with hot-dip galvanized coating in compliance with ASTM A 53.

D. Steel pipe/tubing:

1. ASTM A 53; finish, type, and weight class as follows.

a. Galvanized finish for exterior installations and where specified, black finish elsewhere.
b. Type S, Grade A, standard weight (schedule 40), unless another grade or weight or both required by design loading.

E. Uncoated structural steel sheet: Product type (manufacturing method), quality, and grade, as follows.

1. Cold-rolled structural steel sheet: ASTM A 1008, Grade A, unless otherwise required by design loading.
2. Hot-rolled structural steel sheet: ASTM A 1011, Grade 30, unless otherwise required by design loading.

F. Uncoated steel sheet: Commercial quality, product type (method of manufacture) as follows.

1. Cold-rolled steel sheet: ASTM A 1008.
2. Rolled steel floor plate (Checkered): ASTM A 786, Pattern No. 1, 4 or 5. Use same pattern throughout the Project.
3. Hot-rolled steel sheet: ASTM A 1011.

G. Galvanized steel sheet:

1. Structural quality: ASTM A 653 SQ, Grade 33, G90 designation, unless another grade required for design loading.
2. Commercial quality: ASTM A 653 CQ, G90 coating designation.

H. Stainless steel (MT-2): For carpet border.

1. Bars and shapes: ASTM A 276, Type 316.

I. Concrete inserts:

1. Threaded or wedge type galvanized ferrous castings, either malleable iron complying with ASTM A 47, or cast steel complying with ASTM A 27.
2. Provide bolts, washers, and shims as required, hot-dip galvanized in compliance with ASTM A 153.

J. Welding rods and bare electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

K. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls, elsewhere fasteners may be uncoated. Select fasteners for type, grade, and class required.

1. Bolts and nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, Property Class 4.6; with hex nuts, ASTM A 563; and flat washers, unless otherwise indicated.
2. Anchor bolts: ASTM F 1554, Grade 36.
3. Machine screws: ASME B18.6.3, ASME B18.6.7M.
4. Plain washers: Round, carbon steel, ASME B18.22.1.
5. Lock washers: Helical, spring type, carbon steel, ASME B18.21.1.
6. Drilled-in expansion anchors:
    a. Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [non-drilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade S, by Hilti, Inc., or ITW Ramset/Red Head.
    b. Select anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in masonry and equal to 4 times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E 488.
7. Chemical anchors:
    a. Set by Simpson Strong-Tie Co., Inc., or HY-150 by Hilti, both used with machine bolts complying with FS FF-B-575, Grade S.
    b. Select drilled-in and chemical anchors to resist loads imposed thereon with a safety factor of 4 minimum for static loads, and 10 minimum for dynamic and overhead loads.

8. Lock washers: Helical spring type carbon steel, FS FF-W-84.

L. Grout: Pre-packaged, non-shrink, non-metallic grout, non-staining, nongaseous grout complying with ASTM C 1107.

M. Cement (expansive): Factory-prepared with accelerators quick-setting hydraulic cement complying with ASTM C 595.

N. Shop primer for ferrous metal:

1. Interior surfaces: Tnemec “10-99,” or “Unibond” (basis of design), or equal fast-curing, lead-free, universal modified alkyd primer selected for compatibility with finish paint systems specified in Section 09 90 00, and complying with performance requirements equal to or better than the basis of design.
2. Exterior surfaces: As specified in Section 09 96 00.

O. Galvanizing repair (zinc-rich) paint: “94-H20 Hydro-Zinc” by Tnemec Co., or equal.

P. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 PREFABRICATED UNITS

A. Abrasive stair nosings: Alumogrit Type 101SP aluminum nosing with integral anchoring lugs or studs by Wooster Products, Inc., or equal, consisting of a cast aluminum, abrasive nosing.

1. Abrasive nosings are required on every tread of exterior stairs, and top and bottom tread of every flight of interior stairs. Installation in concrete is specified in Section 03 30 00.
2. Furnish tread inserts 6-inch shorter than length of treads for cast-in-place concrete stairs, and full length for concrete-filled pan stairs.

B. Metal Bollards

1. Fabricate metal bollards from Schedule 80 steel pipe steel shapes, as indicated.
2. Cap bollards with 1/4-inch- thick steel plate.
3. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
4. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
5. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
6. Fabricate sleeves for bollard anchorage from steel [pipe] [or] [tubing] with 1/4-inch- thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
7. Prime bollards with zinc-rich primer.
8. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
9. Bollard Cover: Equal to Bollard Covers by Innoplast, T-(440) 543-8660.
    a. Material: Lo-Density Polyethylene.
    b. Wall Thickness: 1/4-inch nominal.
    c. Color: As selected by Architect from manufacturer’s standard colors.

C. Unistrut framing:

1. Multipurpose steel profiles by Unistrut, Power-Strut, Famet, or equal, complete with manufacturer's standard steel fasteners and connectors, nuts integrally self-locking or

fitted with locking devices. Provide galvanized steel members where embedded in concrete or masonry, and factory-primed items elsewhere.

2. Provide hanger rods, nuts, bolts, connectors, and anchors with electro-galvanized finish.

2.3 FABRICATION - GENERAL

A. Comply with the reference standards and the following.
B. Fabricate and install exterior components to allow for expansion and contraction for a temperature range of 150-degree F without causing buckling, excessive opening of joints, and over-stressing of welds and fasteners.
C. Drill holes for bolts and screws. For screws exposed to view in finished surfaces use FHCS type with screw slots filled and finished flush and smooth with adjacent surfaces.
D. Form exposed work true to line and level with accurate angles and surfaces, and straight, sharp edges, so assembling can be done without filler pieces.
E. Shear and punch metals cleanly and accurately. Remove burrs.
F. Remove sharp or rough areas on exposed surfaces. Projecting edges are not permitted. Ease exposed edges to a radius of approximately 1/32-inch.
G. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Do not use stitch, spot or tack welds on exposed surfaces.
2. For work exposed to view, provide weld quality and finish equal to NOMMA Finish #1. Elsewhere provide weld quality and finish equal to NOMMA Finish #4.
3. Use materials, methods and welding sequence that minimize distortion and develop strength and corrosion resistance of base metals.
4. Obtain fusion without undercut or overlap.
5. Remove welding flux immediately.
6. At exposed connections, undercut edges of components to be welded, weld and finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
7. Where welds will be exposed to the elements, weld connections between various pieces continuously to prevent water intrusion in the weld area, or seal welded parts, after weld is ground, with silicone sealant specified in Section 07 92 00.

H. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise impairing the strength of the material.
I. Form exposed connections with flush, hairline joints, using concealed fasteners wherever possible. Cope intersections of rails and posts, weld joints, and grind smooth; butt weld end-to-end joints of railings or use welding connectors.
J. Bend pipe without collapsing or deforming its walls, to produce a smooth, uniform curved section and to maintain uniform sectional shape.
K. Fabricate joints that will be exposed to the weather with weep holes where water or condensation may accumulate.
L. Fabricate items to be galvanized in accordance with ASTM A 385. Limit use of vent and drain holes and locate where concealed from view in the finish work.
M. Cut, reinforce, drill, punch, thread and tap metal work as required to receive finish hardware and similar items of work.
N. Fabricate items in the largest Sections practical to minimize field jointing.
O. Provide supplementary parts necessary to complete each item of metal fabrication even though such parts may not be shown or specified. Provide all anchors, brackets, and sleeves for securing metal work to adjacent construction.
P. Remove blemishes by grinding before cleaning, treating, and applying specified finishes.

2.4 WELDING

A. Weld shop and field connections continuously in compliance with AWS D1.1, Structural Welding Code - Steel, and AWS D1.3, Structural Welding Code - Sheet Steel, unless bolted connections are specifically shown.
B. Grind welds that will remain exposed, smooth and flush to match and blend with parent metal surfaces. Match approved weld Samples.

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8-inch maximum difference in diagonal measurements.
B. Maximum offset between components at joints: 1/16-inch except that at welded joints no offset is allowed.
C. Maximum misalignment of adjacent members: 1/16-inch.
D. Maximum bow: 1/8-inch in 48-inches.
E. Maximum deviation from plane: 1/16-inch in 48-inches.

2.6 GALVANIZING

A. Follow procedures outlined in ASTM A 143 to safeguard against and test for possible embrittlement.

    1. Exterior: Steel cleaning and preparation followed by hot-dip galvanizing all in accordance with the American Galvanizers Association’s recommendations and Section 09 96 00 in the Specifications.

B. Unless fabricated from galvanized materials, after fabrication hot-dip galvanize exterior ferrous metal items and items installed in exterior walls, which will be concealed when the work is completed and which are totally or partially exposed to the weather, in compliance with ASTM A 123 or A 153, as applicable
C. Excessive dross, rough surfaces, blisters, lumpiness, runs, edge tears, spikes, and chromate quenching are unacceptable.
D. Safeguard assemblies against steel embrittlement in compliance with ASTM A 143, and against distortion in compliance with ASTM A 384.
E. Coating weight shall conform to Table 1 of ASTM A 123, or ASTM A 153, as applicable.
F. Plug vent holes with lead or silicone sealant after galvanizing.
G. If necessary to prevent humid storage staining, quench freshly galvanized steel in a passivating solution.

2.7 SHOP PRIMING

A. Do not shop prime galvanized surfaces.
B. Surfaces exposed in the Work comply with SSPC SP6 followed by application of zinc-rich primer.
C. Surfaces concealed from view: SSPC SP3 followed by rust inhibitive shop primer.
D. Shop prime metal assemblies as follows, unless otherwise specified in Section 09 96 00:

    1. Prepare surfaces as specified above.
    2. Remove loose mill scale, rust, cutting and punching burrs, oil, grease and other deleterious materials before priming.
    3. Immediately after surface preparation, apply primer in compliance with its manufacturer's instructions to provide a uniform dry film thickness of not less than 1-1/2 mils per coat for rust-inhibitive primer and 3.5 to 3.5 mils for zinc-rich primer. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.
    4. Apply primer to completely cover all exposed surfaces as well as surfaces concealed after assembly. Stripe paint corners, crevices, bolts, welds, and sharp edges.
    5. Allow paint to dry thoroughly before handling.

6. Apply one coat of primer to surfaces exposed in the finished work, and 2 coats to surfaces that will be inaccessible after their assembly or erection.

2.8 PROTECTIVE COATINGS

A. Apply a heavy coat of bituminous paint to metal surfaces that will be in contact with cementitious materials. Do not apply on exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Corrosion prevention: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials using heavy bituminous paint at least 10 DFT, hard plastic spacers, Teflon tape, or silicone or neoprene gaskets.
B. Fastening:

1. Provide anchorage devices and fasteners required for attaching metal fabrications to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors required.
2. Dry-pack metal fabrications supported on concrete and masonry as specified in Section 03 30 00 to provide firm, level bearing surfaces.

C. Cutting, fitting and placing:

1. Perform all cutting, drilling and fitting required for installation of metal fabrications.
2. Set items accurately in their proper location, alignment and elevation, plumb, level, true and free of rack as measured from established lines and levels.
3. Provide temporary bracing or anchors for items to be built into concrete, masonry or similar construction.
4. Fit exposed connections accurately to form flush, hairline joints.
5. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and flush with parent metal.

D. Field welding: Comply with AWS Code for procedures of manual shielded arc welding, appearance and quality of welds made, and methods used to correct faulty welds.
E. Installing metal bollards.

1. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
2. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
3. Fill bollards solidly with concrete, mounding top surface to shed water.

F. Prefabricated units: Install as specified, and in compliance with their manufacturer's instructions.
G. Gate hardware:

1. Drill and tap gate frames on the job as required for installation of hardware.

2. Attach hardware accurately fitted to gates and frames with tamper-resistant or concealed means. Install ground-set items in concrete for anchorage.
3. Adjust to operate smoothly and without sticking and binding.
4. Gates shall close uniformly against frame. When open in any position, gates shall remain stationary, without drifting.
5. Latch shall engage strike and keeper regardless of the degree of force with which gates are closed.
6. Where so required for smooth and noiseless operation, lubricate hardware in compliance with its manufacturer instructions.

H. Installation tolerances: Adjust metal fabrications for squareness, alignment, twist, levelness and plumbness to the following tolerances.

1. Squareness where applicable: Plus or minus 1/16-inch, measured on the diagonal.
2. Alignment: Plus or minus 1/16-inch where fabrications are separated by one inch or more; where components join or are separated by less than one inch, components shall be aligned; no deviations permitted.
3. Twist: Plus or minus 1/16-inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
4. Plumbness: Plus or minus 1/16-inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
5. Levelness: 1/8-inch from level, except where tighter tolerances are required for joining or alignment with adjacent work.
6. Deviation from theoretical location in plan: 1/4-inch, except where tighter tolerances are required for joining or alignment with adjacent work.

3.3 FIELD QUALITY CONTROL

A. Extent and Testing Methodology: Owner’s Testing agency may randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.

1. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and will comply with specified requirements.
2. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

B. Touchup:

1. General: Immediately after erection, clean field welds, bolted connections and abraded areas, and proceed as follows.
2. Damaged primer: Clean the damaged area, sand smooth, re-clean and spot-prime with the same paint as that used for shop priming applied to the same dry film thickness as the undamaged primer; minimum thickness of 2 dry mils.
3. Damaged zinc coating:

    a. Clean abraded area in accordance with SSPC-SP11, “Power Tool Cleaning” to bare metal all welds and damaged zinc coating. Extend cleaning 2 inches past damaged area.
    b. Spot prime damaged area with Tnemec “94-H20 Hydro-Zinc” applied at 2.5 to 3.5 Mils DFT.

4. Where galvanized surface will remain exposed in the Work, repair damaged areas with zinc-based solder in accordance with ASTM A 780, regardless of the width of the abrasion (not limited to 3/16-inch).

END OF SECTION

SECTION 05 52 00 – HANDRAILS & RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes steel railings.
B. Furnish inserts for installation by other trades.
C. Related requirements:

1. Division 03 for grouting and dry-packing other than required for the work of this Section.
2. Division 09 for finish painting the work of this Section.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing: Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.
B. Pre-installation meeting:

1.3 SUBMITTALS

A. Shop Drawings:

1. Large scale, dimensioned, indicating in detail methods of fabrication and assembly, weight, materials, holes, lugs, inserts, finishes and other pertinent data.
2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Data: Manufacturer Product Data as follows.

1. Specifications and installation instructions for manufactured items.
2. Manufacturer literature, including engineering data, for drilled-in anchors.

C. Samples: Provide sample of each type of handrail bracket to confirm compliance with CBC 11B-505.6.

1.4 QUALITY ASSURANCE

A. General: The work of this Section requires deferred approval (delegated design).
B. Professional engineer qualifications: California-licensed professional engineer.
C. Fabricator/installer’s qualifications: Firm experienced in producing metal stairs similar to those indicated for the Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
D. Engineering, welding and special inspections: As specified in Section 05 51 00.

1.5 HANDLING

A. Deliver bolts, nuts and washers in bags or boxes, properly tagged for identification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on 72 percent of minimum yield strength.
B. Railings shall be capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Loads: Use loads prescribed by Code.
2. Test method: ASTM E 9335, except as specified below.
3. Handrails:

a. Uniform load applied in any direction.
b. Concentrated load applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

4. Top rails of guards:

a. Uniform load applied horizontally and concurrently vertically downward.
b. Concentrated load applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

5. Infill of guards:

a. Concentrated load applied horizontally on an area of one square foot.
b. Uniform load applied horizontally.
c. Infill load and other loads need not be assumed to act concurrently.

6. Deflection: Limit deflection under uniform load to L/360; L/120 under concentrated load; and 1/4-inch maximum, whichever is more restrictive.

C. Railing configuration to meet CBC 11B-505.
D. Handrail gripping surface. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20 percent of their length. Where provided, horizontal projections shall occur 1-1/2 inches minimum below the bottom of the handrail gripping surface. Comply with Drawings and CBC 11B-505.6.
E. Thermal movements: Provide exterior railings with expansion joints spaced so that no distortion or damage occurs when subjected to a surface temperature of plus 180 degrees and a temperature swing of 160 degrees (plus 20 to plus 180 degrees).

1. Make joints as small as possible but sufficiently wide to meet the design criteria.
2. Show joint spacing on Shop Drawings.
3. Space joints equally and symmetrically. Joint locations are subject to relocation at no additional cost to the Owner.

2.2 MATERIALS

A. Metal surfaces - general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
B. Steel plates, bars and sheets: One of the following.

1. ASTM A 36, except for plates to be cold-formed.
2. ASTM A 283, Grade C for plates to be cold-formed.
3. ASTM A 306, Grade 65 or ASTM A 36 for bars and bar-size shapes.
4. ASTM A 653 SQ for sheets, or A 653 CQ with zinc coating conforming to ASTM A 924, designation G90.
5. ASTM A 575 for hot-rolled carbon steel bars and bar- size shapes.

C. Steel tubing:

1. Cold-formed steel tubing: ASTM A 500, grade as indicated below.

    a. Grade A, unless otherwise indicated or required for design loading.
    b. Grade B, unless otherwise indicated or required for design loading.

2. Hot-formed steel tubing: ASTM A 501. For exterior installations and where otherwise specified, provide tubing with hot-dip galvanized coating in compliance with ASTM A 53.

D. Uncoated structural steel sheet: Product type (manufacturing method), quality, and grade, as follows.

1. Cold-rolled structural steel sheet: ASTM A 611, Grade A, unless otherwise required by design loading.
2. Hot-rolled structural steel sheet: ASTM A 570, Grade 30, unless otherwise required by design loading.

E. Uncoated structural steel sheet: Product type (manufacturing method), quality, and grade, as follows.

1. Cold-rolled structural steel sheet: ASTM A 1008, Grade A, unless otherwise required by design loading.
2. Hot-rolled structural steel sheet: ASTM A 1011, Grade 30, unless otherwise required by design loading.

F. Galvanized steel sheet:

1. Structural quality: ASTM A 653 SQ, Grade 33, G90 designation, unless another grade required for design loading.
2. Commercial quality: ASTM A 653 CQ, G90 coating designation.

G. Concrete inserts:

1. Threaded or wedge type galvanized ferrous castings, either malleable iron complying with ASTM A 47, or cast steel complying with ASTM A 27.
2. Provide bolts, washers, and shims as required, hot-dip galvanized in compliance with ASTM A 153.

H. Welding rods and bare electrodes: Select in accordance Pith AWS specifications for the metal alloy to be welded.

I. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls, elsewhere fasteners may be uncoated. Select fasteners for the type, grade and class required.

1. Bolts and nuts: Regular hexagon head type, ASTM A 307, Grade A.
2. Machine screws: Cadmium-plated steel, FS FF-S-92.
3. Wood screws: Flat head carbon steel, FS FF-S-111.
4. Plain washers: Round, carbon steel, FS FF-W-92.

5. Drilled-in expansion anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [non-drilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5, by Hilti, Inc., ITW Ramset/ Red Head, Star Expansion Co. or The Rawlplug Co., Inc.
6. Lock washers: Helical spring type carbon steel, FS FF-W-84.

J. Grout, dry-pack and paints: As specified in Section 05 50 00.

2.3 MANUFACTURED ITEMS

A. Wall railing brackets:

1. As detailed on Drawings.
2. Bracket configuration shall comply with CBC 11B-505.6.
3. Provide manufacturer’s recommendation for cast steel spacer, to prevent crushing finish material.

2.4 FABRICATION

A. General: Comply with the reference standards and the following.

1. Engineer exterior components to allow for expansion and contraction for thermal movements without causing buckling, excessive opening of joints, and overstressing of welds and fasteners.
2. Remove blemishes by grinding before cleaning, treating, and applying specified finishes.
3. Drill holes for bolts and screws. Screws exposed to view in finished surfaces are not allowed.
4. Form exposed work true to line and level with accurate angles and surfaces, and straight, sharp edges. Shear and punch metals cleanly and accurately; remove burrs.
5. Remove sharp or rough areas on human contact surfaces.
6. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise impairing the strength of the material.
7. Form exposed connections with flush, hairline joints, using concealed fasteners. Cope intersections of rails and posts, weld joints, and grind smooth; butt weld end-to-end joints of railings or use welding connectors.
8. Bend pipe without collapsing or deforming its walls, to produce a smooth, uniform curved section and to maintain uniform sectional shape.
9. Fabricate joints that will be exposed to the weather to exclude water, or provide weep holes where water or condensation may accumulate.
10. Fabricate railings in the largest sections practical to minimize field jointing.
11. Provide supplementary parts necessary to complete each item of railings even though such parts may not be shown or specified. Provide all anchors, brackets, and sleeves for securing metal work to adjacent construction.

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

1. Comply with AWS D1.1, Structural Welding Code - Steel and AWS D1.3, Structural Welding Code - Sheet Steel, unless bolted connections are indicated.
2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
3. Obtain fusion without undercut or overlap.
4. Remove welding flux immediately.
5. At exposed connections, undercut edges of components to be welded, weld and finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

6. Make welded joints light-proof and tight. Where joints will be exposed to the elements, at any time including during construction, close welded joint to air and water infiltration either by welding interface completely, or by sealing remaining space with silicone sealant specified in Section 07 92 00.

2.5 GALVANIZING

A. Unless fabricated from galvanized materials, hot-dip galvanize exterior railings fully and partially exposed to the weather, after their fabrication as specified in section 05 03 00.

1. For the purpose of these Specifications, parking levels not completely enclosed by walls are considered to be "exterior Spaces" and ferrous metals installed therein shall be galvanized.

2.6 FABRICATION TOLERANCES

A. Squareness: 1/8-inch maximum difference in diagonal measurements.
B. Maximum offset between components at joints: 1/16-inch except that at welded joints no offset is allowed.
C. Maximum misalignment of adjacent members: 1/16-inch.
D. Maximum bow: 1/8-inch in 48 inches.
E. Maximum deviation from plane: 1/16-inch in 48 inches.

2.7 SHOP PRIMING

A. Do not shop prime exterior steel scheduled to be galvanized.
B. Apply a heavy coat of bituminous paint to metal surfaces in contact with concrete or masonry. Do not apply on exposed surfaces.
C. Shop prime interior metal assemblies as follows:

1. Prepare surfaces in accordance with SSPC SP3 Power Tool Cleaning and the following.
2. Remove loose mill scale, rust, cutting and punching burrs, oil, grease and other deleterious materials before priming.
3. Immediately after surface preparation, apply primer in compliance with the paint manufacturer's instructions to provide a uniform dry film thickness of not less than 1-1/2 mils per coat. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.
4. Apply primer to completely cover all exposed surfaces as well as surfaces concealed after assembly. Stripe paint corners, crevices, bolts, welds, and sharp edges.
5. Allow paint to dry thoroughly before handling.
6. Apply one coat of primer to surfaces exposed in the finished work, and 2 coats to surfaces that will be inaccessible after their assembly or erection.

a. Coordinate primer with Section 09 90 00A Paint Schedule.

D. Shop prime exterior metal assemblies not galvanized and scheduled to receive high performance coatings as follows:

1. Prepare surfaces in accordance with SSPC SP6 Commercial Blast Cleaning and the following.
2. Remove loose mill scale, rust, cutting and punching burrs, oil, grease and other deleterious materials before priming.
3. Immediately after surface preparation, apply primer in compliance with the paint manufacturer's instructions to provide a uniform dry film thickness of not less than 2.5

mils per coat. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.

4. Apply primer to completely cover all exposed surfaces as well as surfaces concealed after assembly. Stripe paint corners, crevices, bolts, welds, and sharp edges.
5. Allow paint to dry thoroughly before handling.
6. Apply one coat of primer to surfaces exposed in the finished work, and 2 coats to surfaces that will be inaccessible after their assembly or erection.
7. Shop primer: Zinc-rich urethane primer/polyamidoamine epoxy/hybrid polyurethane, fast-cure, with 83 percent zinc content by weight in dried film. Coordinate with Section 09 96 00 High Performance Coatings.

    a. Tnemec 90-97 Tneme-Zinc at 2.5 to 3.5 mils (65 to 90 microns) DFT.
    b. Carboline: Carboline 621.
    c. SW: Corothane 1 galvapac zinc primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Cutting, fitting and placing:

1. Perform cutting, drilling and fitting required for installation of metal fabrications.
2. Set railings accurately in their proper location, alignment and elevation, plumb, level, true and free of rack as measured from established lines and levels.
3. Provide temporary bracing or anchors for items to be built into concrete, masonry or similar construction.
4. Fit exposed connections accurately to form flush, hairline joints.
5. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and flush with parent metal.

B. Fastening:

1. Provide anchorage devices and fasteners required for attaching railings to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, screws other connectors required.
2. Fasten railings securely to supports to safely resist loads thereon.

C. Field welding: Comply with AWS Code for procedures of manual shielded arc welding, appearance and quality of welds made, and methods used to correct faulty welds.
D. Prefabricated items: Install as specified, and in compliance with their manufacturer's printed instructions.

3.3 TOLERANCES

A. Handrail tolerance shall be in compliance with ANSI/NAAMM AMP521-01 (R2012), Part 3.01 E. "Set rails horizontal or parallel to rake of steps or ramp to within 1/4" in 12 feet (1:576)."

3.4 FIELD QUALITY CONTROL

A. Control of corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

B. Extent and testing methodology: Owner’s Testing agency may randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.

1. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and will comply with specified requirements.
2. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Touchup: Refer to Section 05 50 00.

END OF SECTION

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DIVISION 06
WOOD AND COMPOSITES

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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. Section Includes:

1. Framing with dimension lumber.
2. Framing with timber.
3. Framing with engineered wood products.
4. Metal framing anchors and connectors

B. Related Requirements:

1. Division 06 Section "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
2. Division 06 Section "Glued Laminated Construction" for laminated wood members made from dimension lumber.
3. Division 06 Section "Structural Sheathing" for structural panels applied to framing.

C. Reference Documents: Comply with the current edition of the following applicable standards, unless otherwise noted:

1. **CBC – 2022 California Building Code.**
2. American Softwood Lumber Standard DOC PS20.

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. WCLIB: West Coast Lumber Inspection Bureau.
2. WWPA: Western Wood Products Association.
3. CRIS: California Redwood Inspection Services

1.4 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 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, 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.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Shop Drawings for Structural Framing:

1. Show layout of framing system with type, size and grade of each member.
2. Indicate location and extent of chemically treated material.
3. Include and reference details of exposed framing connections.
4. Identify framing hardware locations and required fasteners.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Pre-engineered shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Chemical and epoxy anchors
9. Metal framing anchors.

1.6 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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship[**."**] [**" for the following:**]

1. Dimension lumber framing.
2. Timber.
3. Laminated-veneer lumber.
4. Parallel-strand lumber.
5. Prefabricated wood I-joists.
6. Rim boards.
7. Miscellaneous lumber.

B. 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. For exposed lumber indicated to receive a stained or natural finish, [**mark grade stamp on end or back of each piece**] [**or**] [**omit grade stamp and provide certificates of grade compliance issued by grading agency**].
3. Nominal sizes are indicated on drawings unless noted otherwise, 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.
4. Provide dressed lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber: [15 percent] [19 percent] [15 percent for **2-inch nominal** thickness or less, 19 percent for more than **2-inch nominal** thickness] unless otherwise indicated.

D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2[for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground].

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.[**Do not use inorganic boron (SBX) for sill plates.**]
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 that 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, omit marking and provide certificates of treatment compliance issued by inspection agency.

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. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to

ASTM D 6841.[**Provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.**]

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.[Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.]

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat [all rough carpentry unless otherwise indicated.] [items indicated on Drawings, and the following:]

1. Framing for raised platforms.
2. Framing for stages.
3. Concealed blocking.
4. Framing for non-load-bearing partitions.
5. Framing for non-load-bearing exterior walls.
6. Roof construction.
7. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.

1. Application: Interior partitions not indicated as load-bearing.
2. Species:

a. Douglas-Fir Larch; WCLIB or WWPA.

B. Load-Bearing Partitions: Construction or No. 1 grade.

1. Application: Exterior walls and interior load-bearing partitions.
2. Species:

a. Douglas fir-larch; WCLIB or WWPA.

C. Joists, Rafters, and Other Framing Not Listed Above: [**Select Structural**] [**No. 1**] [**No. 2**] grade.

1. Species:

a. Douglas fir-larch; WCLIB or WWPA.

D. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Application: Exposed [**exterior**] [**and**] [**interior**] framing [**indicated to receive a stained or natural finish**].
2. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 TIMBER FRAMING

A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; [**Select Structural**] [**No. 1**] grade; NLGA, WCLIB, or WWPA.

2. Maximum Moisture Content: 19 percent.
3. Additional Restriction: Free of heart centers.

2.6 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.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and the following species:

1. Western woods; WCLIB or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

D. 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.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, [**fire-retardant treated,**] in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.8 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.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies 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 and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.9 METAL FRAMING ANCHORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Simpson Strong-Tie Co., Inc [**Insert Catalog Number**] or comparable product. See drawings for model numbers.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those of the Basis of Design Product. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

E. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

F. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.

1. Thickness: 0.050 inch, minimum.

G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

1. Strap Width: 1-1/2 inches, minimum.
2. Thickness: 0.050 inch, minimum.

H. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

I. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

1. Width: 1-1/4 inches, minimum.
2. Thickness: 0.050 inch, minimum.
3. Length: As indicated.

J. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.

K. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

L. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

M. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

1. Bolt Diameter: 5/8 inch, minimum.
2. Self Drilling Screws: ¼” diameter, minimum
3. Width: 2-1/2 inches, minimum.
4. Body Thickness: 0.138 inch, minimum.
5. Base Reinforcement Thickness: 0.239 inch, minimum.

2.10 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole, unless noted otherwise.

F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

G. Do not splice structural members between supports unless otherwise indicated.

H. Provide blocking and framing as 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 o.c.

I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

J. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in **California Building Code**.

M. Use steel common 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 between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable.
2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

O. Install wood screws and lag screws of size and length indicated on the Drawings and as required for specified hardware. Use of pre-drilled lead holes shall not inhibit full tightening of screw or lag screw.

1. Pre-drilled lead holes not required for wood screws in douglas fir-larch framing material.
2. Pre-drill of lead holes for lag screws greater than 3/8” diameter shall not be less than 40% nor exceed 70% of the root diameter of the lag screw. Lag screws equal to or less than 3/8” diameter in douglas fir-larch framing material shall not be predrilled unless approved prior to installation.

P. Install bolts of size and length indicated on the Drawings and as required for specified hardware.

1. All holes in members shall be standard sized, bolt diameter +1/16 inch, unless noted otherwise.
2. Provide plate washers where indicated. Provide standard cut washers at all other locations.
3. Full tightening bolts shall not cause countersinking or crushing of wood fibers.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.

1. For exterior walls, provide [**2-by-6-inch nominal-**] [**2-by-4-inch nominal-**] size wood studs spaced 16 inches o.c. unless otherwise indicated.
2. For interior partitions and walls, provide [**2-by-6-inch nominal-**] [**2-by-4-inch nominal-**] size wood studs spaced 16 inches o.c. unless otherwise indicated.
3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 CEILING JOIST AND RAFTER FRAMING INSTALLATION

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 TIMBER FRAMING INSTALLATION

A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.

B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.

C. Install wood posts using metal anchors indicated.

D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

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. Subfloor sheathing and underlayment.
4. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Division 06 Section "Rough Carpentry" for plywood backing panels.
2. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

C. Reference Documents: Comply with the current edition of the following applicable standards, unless otherwise noted:

1. **CBC – 2022 California Building Code.**
2. Product Standard 1-95 of the U.S. Department of Commerce (DOC PS1-95).
3. Product Standard 2-92 of the U.S. Department of Commerce (DOC PS2-92)
4. The Engineered Wood Association (APA) Panel Design Specification and Supplements.

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 a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. LEED Submittals:

1. Certificates for [**Credit MR 6**] [**Credit MR 7**]: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
2. Product Data for Credit EQ 4.1: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
4. Laboratory Test Reports for Credit EQ 4: For [**adhesives**] [**and**] [**composite wood products**], documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.5 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.

1.6 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-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Certified Wood: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1. Plywood.
2. Oriented strand board.
3. Particleboard underlayment.
4. Hardboard underlayment.

C. Plywood: DOC PS 1.

D. Oriented Strand Board: DOC PS 2.

E. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

F. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood indicated on Drawings, and the following:

1. Roof[**and wall**] sheathing within 48 inches of [**fire**] [**party**] walls.
2. Roof sheathing.
3. Subflooring and underlayment for raised platforms.

2.5 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than 1/2 inch.

B. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than 1/2 inch.

2.6 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than [**32/16**] [**40/20**] [**48/24**].
2. Nominal Thickness: Not less than [**15/32 inch] [19/32 inch] [23/32 inch].**

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

1. Span Rating: Not less than [**32/16**] [**40/20**] [**48/24**].
2. Nominal Thickness: Not less than [**1/2 inch**] [**5/8 inch**] [**3/4 inch**].

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 and floor sheathing provide common wire nails of lengths indicated

2. For wall sheathing provide common wire nails of lengths indicated

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

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.

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to 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.

1. Adhesives shall have a VOC content of [**50**] [**70**] <**Insert limit**> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

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. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

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 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

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

1. Place face grain perpendicular to supports for underlayment and roof sheathing.
2. Stagger joints in adjacent panels a minimum of 24 inches
3. Floor and roof panels shall span a minimum of three supports (double span).
4. Use full width panels to the greatest extents possible. Minimum panel width shall not be less than 24 inches

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exposed, site finished, non-structural wood items other than casework and paneling:

1. Wood baseboards.
2. Wood doors frames.
3. Rough and finish hardware for this work.
4. Nailers and blockings for the work of this Section.

B. Related requirements:

1. Section 06 10 00 for rough carpentry.
2. Division 08 for the following:
3. Wood doors and all other hardware.

1.2 SUBMITTALS

A. Shop Drawings: Shop Drawings meeting the requirements of the NAAWS for each item showing, at large scale, materials, dimensions, profiles, and fabrication details.

B. Samples:

1. **
2. Finished wood samples: Minimum 12- -inch sample for each wood type and finish.
3. Full size Samples of hardware.

1.3 QUALITY ASSURANCE

A. Requirements of regulatory agencies: Provide evidence of compliance with Code for finish carpentry.

B. Installer qualifications:

1. Firm certified by WI under their "Accredited Millwork Company" or millwork manufacturer, or.
2. Firm specializing in finish carpentry with 3 years experience in installation of custom millwork similar to that required for this project.

C. Mockups:

1. Before starting production work, assemble a ****** mockup of the following items for the Architect's review and approval:
2. _____ to be determined.
3. _____ to be determined.
4. Approved ******mockups will be used as a standard for the Work.

1.4 HANDLING

A. Protection:

1. Protect materials against exposure to weather and contact with damp or wet surfaces.

2. Stack lumber as well as plywood and other panels indoors.
3. Provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

1.5 PROJECT CONDITIONS

A. Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MEDIUM DENSITY FIBERBOARD (MDF):

A. ANSI A 208.2, 47 pcf density minimum; 115 psi internal bond, 4,400 psi modulus of rupture; water absorption 7 percent maximum, screw holding face 310 lb.; screw holding edge 260 lb.; assembled with methylene diphenyl diisocyanate (formaldehyde free).
B. Hardboard: AHA A135.4. Class 1, tempered both sides. Thickness: 1/4-inch.

2.2 LUMBER

A. Seasoning: Wood shall be properly kiln-dried according to accepted methods for the thickness and species required in compliance with the reference WI standard.
B. Species and grade:

1. For solid wood shelves: As indicated on the Drawings.
2. Concealed nailers and blockings: Douglas Fir conforming to WI section 3 Economy Grade.
3. Miscellaneous exposed surfaces:
4. MDF, Birch or Poplar.
5. Ponderosa Pine complying with NAAWS Custom Grade.
6. Clear Fir, Pine or Redwood.

a. Iroko.
b. Ipé.
c. Plantation Golden Burmese Teak.

2.3 CLOSET AND UTILITY SHEVING

A. Wood:

1. Grade: [Premium] [Custom] [Economy].
2. Shelf Material: 3/4-inch [solid lumber] [veneer-faced panel product with solid-lumber edge] [veneer-faced panel product with veneer edge banding] [thermoset decorative panel with solid-lumber edge] [thermoset decorative panel with PVC T-mold edge] [medium-density fiberboard with solid-lumber edge] [particleboard with solid-lumber edge] [medium-density fiberboard with radiused edge] [particleboard with radiused and filled edge].
3. Cleats: 3/4-inch [solid lumber] [thermoset decorative panel] [panel product].
4. Wood Species: [Red oak] [Match species indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated] [Match species indicated for door to closet where shelving is located] [Any closed-grain hardwood] [Eastern white pine, sugar pine, or western white pine] <Insert species>.
5. Closet Rods: 1-1/2-inch- diameter, [red oak] [hardwood] [Douglas fir or southern pine] <Insert species>.

6. Closet Rods: 1-5/16-inch- diameter, [aluminum] [chrome-plated-steel] [color-coated-steel] [stainless-steel] tubes complying with BHMA A156.16, L03131.
7. Rod Flanges: Clear, kiln-dried, [red oak] [hardwood] [Douglas fir or southern pine] [eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine] <Insert species> turnings.
8. Rod Flanges: [Aluminum] [Chrome-plated steel] [Stainless steel].

B. Metal Shelving Specialties:

1. Manufacturer: Schulte or Closet Maid.
2. Materials: Grade C-1008 bright basic cold drawn steel wire, average tensile strength 100,000 psi.
3. Fabrication: Provide vinyl coated steel rod ventilated shelving and rod resistance welded at intersections of cross deck wires. Provide deck rod spacing on one-inch increments.
4. Support spacing: Shelf brackets at not over 3 feet - 6 inches o.c.
5. Fasteners: As recommended by system manufacturer for substrate and loads to be supported; provide blocking between studs as required.
6. Finish: Clean, prime, and vinyl coat metal with a non-exudating formula PVC applied 10 to 12 DFT. Elasticity of vinyl coating shall be sufficient to prevent chipping and cracking.
7. Provide closet systems complete with all fittings, brackets, and appurtenances required for installation.
8. Color: As selected by the Architect.

2.4 ROUGH HARDWARE

A. Wood screws, nails and bolts: Sizes and configurations as selected by the Contractor.
B. Toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete work for anchorage.
C. For exterior work, provide hot-dip galvanized stainless steel fasteners (nails, screws, bolts, nuts and washers); plated fasteners are not acceptable.

2.5 FINISH MATERIALS

A. Fillers, sealers, stains and finish coating systems: RJ McGlennon Co., Inc. Sherwin Williams, Sikkens, Minwax, WD Lockwood (stains and dyes), or equal, used with compliant stains and bases.

1.
2. Sherwin Williams.
3.

2.6 MANUFACTURED ITEMS

A. Wood ballet barres with brackets by one of the following manufacturers:

1. Alva’s Dance and Theatrical.
2. Cartwheel Factory.
3. Dance Equipment International.

2.7 FABRICATION

A. General:

1. Fabricate finish carpentry to the dimensions, profiles and details shown.
2. Unless otherwise indicated, use MDF for work to receive an opaque finish.
3. Unless otherwise acceptable to the Architect, do not use finger-jointed lumber.
4. Where necessary to fit at site, provide ample allowance for cutting and fitting.

5. Whenever possible, conceal means of fastening various parts and members together in windows.. Where exposed nailing is unavoidable, neatly set nails for putty stopping.

B. Wood trim:

1. Fabricate to profiles and dimensions shown in compliance with NAAWS, Premium Grade requirements where scheduled to receive a transparent finish; Custom Grade requirements where scheduled to receive an opaque finish.
2. Rout-out the back of trim members to be applied to flat surfaces, except for members with ends exposed in the finished work.

2.8 FINISHING

A. In preparation for finish, clean woodwork and fill nail holes. Use matching wood filler where woodwork will receive a transparent finish.
B. Finish woodwork smoothly dressed, belt-sanded at mill and hand sanded before its installation. Finish surfaces shall be free from open joints, hammer and machine marks, structural defects and surface blemishes.
C. For interior woodwork scheduled to receive a transparent finish: Comply with NAAWS and the following.

1. Grade: Match the NAAWS Grade of the finish to the Grade of the items to be finished.
2. System: NAAWS system No. 2, water reducible acrylic lacquer.
3. Filler: Fill open grain wood.
4. Staining: Match Architect’s control Samples.
5. Sheen: 10 to 15 gloss range, ASTM D 523Match Architect’s control Samples.

D. For exterior woodwork, apply one or more coat of semi-transparent stain specified in Section 09 90 00. Apply stain on all surfaces, whether exposed or concealed, except that concealed surfaces need only on coat.
E. Backprime woodwork on all surfaces which will be concealed with one coat of wood primer. Schedule delivery to allow time for application and drying of backprime coat before installation of woodwork for those items that are not backprimed in the shop; for work scheduled to receive a transparent finish, backprime with a clear varnish.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Verify that detrimental conditions are corrected before proceeding with installation.
C. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

3.2 INSTALLATION

A. Install work of this Section, plumb, level, with tight, hairline, flush joints. Shim as required using concealed shims.
B. Cut to fit when not shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished surfaces, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.

3.3 METAL SHELVING SPECIALITIES INSTALLATION

A. Secure brackets to wall with enough clearance between closet doors and rack so as not to obstruct movement of closet doors (for closet shelving), and so that shelving is level.

B. Install systems securely to backing plate or metal studs as recommended by system manufacturer and applicable to construction indicated, to permanently support continuous loading without sagging or failure.
C. Provide all fittings recommended by manufacturer for conditions of installation.

3.4 BALLET BARRES INSTALLATION

A. Install over mirrors in accordance with their manufacturer's instructions and the approved shop drawings.

3.5 FIELD QUALITY CONTROL

A. Clean exposed surfaces and leave ready to be painted for surfaces to be field painted (opaque finish only).
B. Field touchup, for work with a transparent finish, is the responsibility of the installer and shall include filling in of nail holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final clean-up of the finished surfaces.
C. Protecting:

1. Do not store materials adjacent to woodwork unless it is protected against damage and staining.
2. When painting or touching-up surfaces contiguous to woodwork, mask it with non-staining Kraft paper and tape.

D. Replace woodwork damaged beyond satisfactory field repair, as determined by the Architect, with satisfactory millwork.

END OF SECTION

SECTION 06 41 13 - WOOD-VENEER-FACED CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Factory-finished wood veneer-clad casework, display cases, countertops and matching wood base.
2. Items associated or integral with architectural woodwork:
    a. Supports, reinforcement, and like components.
    b. Hardware and accessories.
    c. Castors.
    d. Concealed steel supports and exposed ornamental metalwork incorporated in casework.

B. Related requirements:

1. Division 05 for concealed tube supports and ornamental metal integral with architectural woodwork.
2. Division 06 for the following: Rough carpentry for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
3. Division 09 for interior finishes, and for painting.
4. Division 12 for multiple countertop and stone veneer surfaces.
5. Division 22 for plumbing fixtures and fittings related to architectural woodwork.
6. Division 26 for light fixtures integral with architectural woodwork.

1.2 REFERENCES

A. Architectural Woodwork Standards (NAAWS) published by the Woodwork Institute (WI) and the Architectural Woodwork Manufacturers of Canada (AWMC).

1.3 SUBMITTALS

A. Procedure: In accordance with NAAWS.
B. Product data:

1. Submit for specialty items required by this Section that are not manufactured by the millwork manufacturer, and the following:
    a. Evidence of no added Formaldehyde panel products.
    b. FSC Certified products.
    c. Adhesive for attachment of marble to faces of boxes.

C. Qualification Data: For manufacturer/installer to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, along with names and addresses of owners.

D. Shop drawings:

1. Comply with NAAWS standards.
2. Furnish a WI Certified Compliance Label on the first page of shop drawings.
3. The Drawings are diagrammatic and show required profiles and dimensions. Submit large scale, dimensioned, shop drawings showing location of each item of millwork, plans and elevations, large-scale details, attachment devices, finishes, and finish hardware types and locations.
    a. Include hardware list, identifying each item by manufacturer, catalog number, size, finish and intended use. Include catalog cut sheets.
    b. Indicate method of seismic construction by WI-Seismic Test Codes Number.
    c. Coordinate shop drawings with the work of other Sections which is a part of, or will be incorporated with the architectural woodwork, such as plumbing, electrical, and electronic equipment, along with adjacent and abutting materials to which this work is to be secured.

E. Samples:

1. Lumber and panel products:
    a. Submit 4 samples for the following, minimum 8 by 10 inches:
        1) Lumber with or for transparent finish for each lumber specie and cut, finished on one side and one edge.
    b. Veneer: Leaves representative of and selected from fitches showing species, cuts, finishes, textures and patterns proposed to be used.
    c. Veneer-faced panel products with or for transparent finish for each species and cut: Include at least one face-veneer seam and finish as specified.
2. Corner pieces:
    a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    b. Miter joints for standing trim.
3. Hardware: One unit for each type of exposed cabinet hardware and accessories, and finish samples.
4. Approved samples will serve as University Representative’s control samples.

F. Closeout: Deliver all documentation required herein, including but not limited to as-built shop drawings reflecting changes made in the course of the Project.

1.4 QUALITY ASSURANCE

A. General: Work shall be in accordance with NAAWS standards for the grade or grades specified.

B. Woodwork Institute (WI) Certification:

1. Manufacture millwork, casework and cabinetwork in accordance with the standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in the grade or grades herein specified or as shown on the Drawings.
    a. Before delivery to the Project site, submit a WI Certified Compliance Certificate indicating that the millwork products being supplied and certifying that said products meet the requirements of the Grade or Grades specified.
    b. Label each elevation of casework; and each solid surface top with a WI Certified Compliance Certificate Label in a location that will be concealed after installation.
    c. At completion of installation of the woodwork, submit a WI Certified Compliance Certificate indicating the products installed and certifying that the installation of said products meets the requirements of the Grade or Grades specified.
    d. Fees charged by the WI for their Certified Compliance program shall be at no additional cost to the University.

2. The foregoing shall not be construed to limit the power and authority of University's Representative to reject millwork which does not, in University's Representative's opinion, meet with the requirements, including standards of the Specifications of this contract.

C. Manufacturer qualifications: Firm with not less than 5 years of production experience similar to this Project, whose qualifications indicate the ability to comply with the requirements of this Section.

D. Installer qualifications:

1. Manufacturer of casework, or
2. Firm licensed by WI or AWS under their "Certified Compliance Program," or
3. Firm specializing in custom millwork with 5 years experience in installation of custom millwork similar to that required for this Project.

E. Single source responsibility: A single manufacturer shall produce and install the work of this Section.

F. Special design requirements: Sequence-matched wood veneers and wood doors with face veneers that are sequence-matched with woodwork and transparent-finished wood doors required to be of same species as work of this Section.

G. Quality standard: Unless otherwise indicated, comply with NAAWS standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

H. Requirements of regulatory agencies: Furnish evidence of WI compliance for architectural woodwork.

1. Particle board, MDF, and hardwood plywood used in the Project must comply with California Air Resource Board standards for formaldehyde emissions.
2. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to the University's Representative. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by University's Representative, imprint on surfaces of materials that will be concealed from view after installation.

I. Mockup:

1. See Division 01 for mockup requirements.
2. Before starting production work, assemble a mockup as follows for University's Representative's approval:
    a. One base cabinet with one door, and hardware with transparent finish.
    b. One section of countertop separates for the cabinet, 12 inches by full depth with one finished end, including front edge and backsplash, is required.
    c. Finish the mockups as intended for the finish work.
    d. Approved mockups will be used as a standard for the Work.

J. Energy and environment:

1. MDF and/or particle board used shall be FSC Certified 100 percent post-consumer recycled content.
2. Furnish Chain of Custody documentation of the FSC Certified products.

1.5 HANDLING

A. Procedure: In accordance with NAAWS standards.
B. Delivery:

1. Deliver materials to Project site in protective wrappings clearly labeled with identification of manufacturer, item name and specific installation location.
2. Deliver architectural woodwork only when the area of operation is enclosed and broom clean, and cementitious work is dry.

C. Storage:

1. Store materials in a clean, well-ventilated storage area protected from direct sunlight, excessive heat, rain and moisture; in which relative humidity is between 45 and 65 percent at 60 to 90 degrees F.
2. The air conditioning or heating system shall be on and functioning and the architectural millwork shall be acclimated to these conditions for 72 hours prior to installation.
3. Do not subject millwork to abnormal heat, extreme dryness, humid conditions, sudden changes in temperature, or direct sunlight.
4. Store cabinets carefully and set or store on a level floor. Protect the exposed finished portions from bumping, scratching, staining and other damage.

D. Handling: Handle with clean hands, taking care not to slide one item over the other; when primed or sealed, properly re-stack when dry.
E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

1.6 PROJECT CONDITIONS

A. Acclimation: Condition materials to moisture content between 8 percent and 12 percent.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements NAAWS quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
B. Species: Match University's Representative's sample. See Materials Legend.
C. Lumber:

1. Seasoning: Wood shall be properly kiln-dried according to accepted methods for the thickness and species required, with moisture content of 6 percent to 12 percent for boards up to 2 inches nominal thickness and shall not exceed 19 percent for thicker pieces.
2. Pressure-treatment: As specified in Section 06 10 53.
3. For a transparent finish: Match species and cut of contiguous veneer specified below.

D. Panel core products:

1. Medium density fiberboard (MDF) or particleboard.
2. Substrate for marble countertops: Marine grade B-B.
3. Softwood Plywood: DOC PS 1, Medium Density Overlay.
4. Veneer-faced panel products (hardwood plywood): HPVA HP-1, non-telegraphing hardwood manufactured with exterior adhesive containing no urea formaldehyde.

E. Exposed surface, see the Materials Schedule.
F. Semi-exposed surfaces:

1. Interior faces of doors: Veneer of the same species and cut as the exposed surfaces.
2. At open cabinets: Veneer of the same species and cut as the exposed surfaces.
3. At all other locations: Veneer of the same species and cut as the exposed surfaces.

G. Edgebands: Veneer of the same species and cut as the exposed surfaces.

2.2 HARDWARE AND ACCESSORIES

A. General:

1. As required for a complete installation, as indicated and specified, and as listed in WI's current Approved Hardware Listings, except as herein modified.
2. Hardware finish shall match existing casework door hardware, unless otherwise noted.

B. Hinges:

1. NAAWS-compliant.
2. Grade 2, concealed (European style) with 3-way independent adjustment.
3. Self-closing, 170-degree opening, except 90 degrees where door opens against a wall, or otherwise limited to 90 degrees.
4. Back-mounted pulls: BHMA A156.9, B02011.

C. Pulls: See Drawings for pulls.
D. Catches: Magnetic, BHMA A156.9, B03141.
E. Adjustable shelf standards and supports:

1. BHMA A156.9, B54071; with shelf rests, B54081.

2. Shelf supports for adjustable shelves in wall-hung cabinets and the upper half of tall cabinets shall be designed to prevent shelves from sliding forward in a seismic event.
3. Provide stainless steel supports, plastic is not acceptable.

F. Drawer slides: WI- approved, self-closing metal runners with ball-bearing rollers, full extension type, side mounted.

1. General purpose drawers: 75 lb. rated.
2. General purpose drawers more than 24 inches wide or 6 inches deep: 100 lb. rated.
3. File drawers: 100 lb. rated.
4. Lateral file drawers more than 24 inches wide: 150 lb. rated.
5. Trash bin slides: Grade 1HD-200; for trash bins not more than 20 inches high and 16 inches wide.

G. Locks: 6-pin tumbler lock with single bitted keys. Unless otherwise instructed by the University, key all keyways in the same room or space alike. Provide the following with a minimum of 4 keys per lock.

1. Door locks: BHMA A156.11, E07121.
2. Drawer locks: BHMA A15611, E07041.

H. Catches: Magnetic, BHMA A156.9, B03141.
I. Grommets for trash: TM1B 6-inch by 2-inch stainless steel grommet by Doug Mockett & Co., or equal.
J. Grommets for cable passage through countertops: by Doug Mockett & Co., Inc., or equal.

1. MAX15-23 - 11-1/2" MAX Desk Grommet w/ USB (black).
2. MM5/SET - 2-7/8" MM5 Solid Brass Desk Grommet - Cap & Liner Set (black).

K. Anchors and fasteners:

1. Wood screws, nails and anchors: As selected by the fabricator provided they result in permanent connections.
2. Toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete work for anchorage. Refer to Section 09 22 16 for general requirements on fasteners and anchors, and for limitations on the use of shotpins.

L. General Adhesives: Type I, water-resistant.
M. Adhesive for Marble: As recommended by marble supplier.

2.3 FINISHES

A. Wood finishes, general: In accordance with WI/AWS section 5 – Finishing, and as indicated on Materials Schedule..
B. Hardware finishes:

1. Exposed hardware finishes, complying with BHMA A 156.18 for BHMA finish number indicated.
    a. Satin stainless steel: BHMA 630.

2. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 FABRICATION, GENERAL

A. Casework:

1. General: Fabricate casework in compliance with requirements of NAAWS Premium Grade.
2. NAAWS construction types: As detailed.
3. NAAWS cabinet and door interface: As detailed.

B. Openings in casework for equipment provided under this Contract:

1. Examine size of equipment by measuring the actual equipment, from shop drawings, or from templates furnished by those furnishing the equipment.
2. Make accurate cutouts and openings, plumb, level and square. When the equipment does not cover cut edges, finish edges same as faces.
3. Sand edges of cutouts to remove splinters and burrs.
4. Seal edges of openings in countertops with a coat of varnish.

C. Panels with fixed louvers:

1. Join stile and rail with fully glued mortise and tenon construction.
2. Finish faces true, with stile and rail intersections and other copes well fitted, with stickings clean cut and smooth.
3. Ease all edges.
4. Louver slats shall overhang each other not less than 1/8-inch, shall be mortised into stiles and shall be set at an angle 45 to 60 degrees from horizontal.

D. Fire-retardant wood: Sand lightly to remove raised grain on exposed surfaces before fabrication.
E. Finish hardware: Fit accurately and install in compliance with its manufacturer's instructions. Accurately fit doors and drawers with uniform clearance at all edges. Gaps between doors, drawers and false fronts shall not exceed 1/8-inch.

2.5 WOOD FOR TRANSPARENT FINISH

A. General:

1. Match Architect’s control samples. In preparation for finish, clean woodwork and fill nail holes using matching wood filler.
2. Finish woodwork at the mill, smoothly dressed. Sand, using same sequence and grade of abrasive used in the University Representative’s control sample to achieve the same finish. Clean woodwork thoroughly with a tack cloth.
3. Produce surfaces free from open joints, hammer and machine marks, structural defects and surface blemishes.

B. Veneer, meeting requirements of the NAAWS for the Grade specified above:

1. Grain Direction: diagonally for drawer fronts, doors, and fixed panels.
2. Vertical Matching of Veneer Leaves: Book match.

C. Semi exposed veneer surfaces:

1. Surfaces other than drawer bodies: Same species and cut indicated for exposed surfaces.
2. Drawer sides and backs: Solid-hardwood lumber, same species indicated for exposed surfaces.
3. Drawer bottoms: Hardwood plywood.

2.6 SHOP FINISHING

A. General: Finish architectural woodwork at fabrication shop as specified in this Section and as shown on the Materials Schedule. Defer only final touchup, cleaning, and polishing until after installation.
B. Grade: Provide finishes of same grades as items to be finished.
C. Preparation for finishing:

1. Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
2. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply 2 coats to back to end-grain surfaces. Back prime woodwork on all surfaces that will be concealed. Schedule delivery to allow time for application and drying of back prime coat before installation of woodwork for those items that are not back primed in the shop.

D. Transparent finish: Match University's Representative's control samples for finish and sheen.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

3.3 INSTALLATION

A. General:

1. Comply with AWS requirements for Grade of the items being installed.
2. Install work plumb, level, true and straight with no distortions, to a tolerance of 1/8 inch in 8 feet from plumb and level.
3. Shim using concealed shims.
4. At gypsum board construction, anchor through wall surface to backing plates and studs. Indicate location of required concealed backing on casework shop drawings.
5. Furnish fillers, closures and trim as required for a complete installation. Scribe in place where required.

6. Subdrill holes in pieces where splitting may occur; size holes slightly smaller than diameter of nail.
7. Do not drive nails closer to edge of lumber than 1/4 length.
8. Remove lumber split in nailing and replace with sound members.
9. Make joints accurately and neatly, square, flush and tight.
10. Install wood screws and lag bolts with complete penetration to head. Bore lead holes equal to root diameter of the screw or bolt. Drive flush or recess with nailer face.
11. Provide nailers and blockings where indicated and required.

    a. Template and drill to match anchor bolts in steel members, concrete and masonry.
    b. Where materials are applied over flush nailer surfaces, use carriage bolts with heads drawn flush into top of nailer or blockings, or counter-bore holes to recess washers and heads of nuts.

B. Pressure-treated wood products: Do not rip or mill treated lumber. End cuts, drilling holes and joining cuts are permitted. Plywood may be cut in any direction.

1. Use pressure-treated wood where required by Code and as specified above.
2. Use fire-treated wood where required for blockings and nailers located in metal-framed walls, partitions and ceilings.

3.4 ANCHORAGE

A. Fastening lumber or plywood to lumber:

1. Space nails a maximum of 12 inches o.c. and stagger across face of piece. Locate fastener also within 3 inches of each end of piece.
2. Drive nail heads flush with wood surfaces. Nails shall penetrate adjoining piece a minimum of 1-1/4-inch.

B. Fastening lumber or plywood to concrete or to masonry:

1. Space anchors a maximum of 36 inches o.c. and stagger if lumber is more than 5 inches wide.
2. Make anchor heads flat or countersunk flush with surface, but not countersunk more than 1/3 the thickness of piece to be fastened.
3. Anchor withdrawal resistance shall be a minimum of 400 lb. per anchor, or number of fasteners increased accordingly from that specified. Minimum penetration of 1-1/2-inch into concrete or masonry.

C. Fastening lumber or plywood to steel:

1. Space screws a maximum of 24 inches o.c. and stagger if lumber is more than 5 inches wide.
2. Drive screw heads flush with face of plywood or lumber.
3. Anchor shall penetrate a minimum of 1/4 inch through the steel.

3.5 CASEWORK

A. Cabinets:

1. Install in a manner consistent with the specified quality grade, plumb, level, true and straight with no distortions.

2. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and t ensure unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Maintain veneer sequence matching of cabinets with transparent finish.

B. Install cabinets with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.
C. Doors and drawers shall operate freely, but not loosely, without sticking or binding, with all hardware adjusted and functioning properly.
D. Secure to ground, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a satisfactory installation. Scribe and cut for accurate fit to adjacent finished surfaces.
E. Properly scribe work abutting other building components.
F. Countersink mechanical fasteners used at exposed and semi-exposed surfaces, excluding installation attachment screws and those securing cabinets end to end.

3.6 FIELD QUALITY CONTROL

A. General: Field touchup shall be the responsibility of the installer and shall include filling in of nail holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final clean-up of the finished surfaces.
B. Protecting:

1. Do not use the top of casework for storage.
2. Do not store materials adjacent to woodwork unless it is protected against damage and staining.
3. When painting or touching up surfaces contiguous to woodwork, mask it with non-staining Kraft paper and tape.

C. Replace millwork damaged beyond satisfactory field repair with satisfactory millwork as determined by the University’s Representative.
D. During final cleaning, remove protective covering and clean interior and exterior surfaces using procedures and materials recommended by manufacturer.

3.7 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
B. Clean woodwork on exposed and semi-exposed surfaces. Touchup shop-applied finishes to restore damaged or soiled areas.
C. Clean, lubricate, and adjust hardware.
D. Do not bury wood of any type on the jobsite.

END OF SECTION

SECTION 06 41 16 - PLASTIC LAMINATE CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic laminate casework
2. Hardware typically furnished by the casework manufacturer
3. Shelving
4. Structural supports incorporated into wood casework

B. Excluding:

1. Metal support brackets and fittings that are part of the building structure
2. Plumbing, electrical fixtures, and telephone equipment

C. Related sections:

1. Section 01 13 00 - Delegated Design Requirements.
2. Section 05 50 00 - Metal Fabrications.
3. Section 09 22 16 - Non-Structural Metal Framing.
4. Section 12 36 40 - Stone Countertops.
5. Section 12 36 61 - Quartz Countertops.
6. Division 22, Plumbing: Fixtures and fittings installed in countertops

1.2 REFERENCES

A. The North American Architectural Woodwork Standards (NAAWS), latest edition. Jointly published by Woodwork Institute and the Architectural Woodwork Manufacturers Association of Canada.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Delegated engineering: Concealed reinforcement and supports built-in the work of this Section requires deferred approval from Authorities Having Jurisdiction (AHJ). Refer to, and comply with, Section 01 13 00.
B. Preinstallation meeting: Schedule a preinstallation meeting in compliance with Article 1.7 of Section 01 31 00.
C. Coordination: Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

1.4 SUBMITTALS

A. Procedure: In accordance with NAAWS except as modified by these specifications.
B. Delegated engineering submittal: Comply with the provisions of Section 01 13 00.
C. Product Data: For the following.

1. Anchors.
2. Adhesives.
3. Shop finishing materials.

4. Wood-preservative treatment:
    a. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
    b. Indicate type of preservative used and net amount of preservative retained.
    c. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's warranty.
5. Fire-retardant treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with specified requirements.
6. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

D. Shop Drawings: Certified Compliance includes Shop Drawings label; Shop Drawings without label will not be reviewed.

1. Comply with NAAWS standards.
2. Furnish a WI Certified Compliance Label on the first page of Shop Drawings.
3. Location of each item of millwork. Identified by room or space number.
4. Dimensioned plans and elevations.
5. Large-scale details.
6. Attachment devices.
7. Locations and sizes of concealed and exposed cutouts or items installed in casework.
8. Locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
9. Hardware list identifying each item by manufacturer, catalog number, size, finish and intended use. Submit catalog cut sheets for each hardware item with the Shop Drawings.
10. Method of seismic construction by WI-Seismic Test Codes Number.
11. Description of finishes.
12. Shop Drawing Submittal Requirements: Submit enlarged partial floor plans at minimum drawing scale 1/2”=1’-0”. Submit enlarged partial elevations and sections at minimum scale 1/2"=1’-0”. Submit large scale details of all architectural cabinet and woodworking components, transitions, and typical conditions. Minimum detail drawing scale is 6”=1’-0”. Submit additional details as requested by Architect.
13. The Drawings are diagrammatic and show required profiles and dimensions. Submit large scale, dimensioned, Shop Drawings showing location of each item of millwork, plans and elevations, large-scale (minimum 1:4) details, attachment devices, finishes, and finish hardware types and locations.
    a. Include hardware list identifying each item by grade, manufacturer, catalog number, size, finish and intended use. Include catalog cut sheets.
    b. Indicate method of seismic construction by NAAWS-Seismic Test Codes Number, where relevant, or provide structural calculations signed and sealed by a California-licensed professional engineer.
    c. Coordinate Shop Drawings with the work of other related trades which is a part of, or will be incorporated with the architectural woodwork, such as plumbing, electrical and electronic equipment, along with adjacent and abutting materials to which this work is to be secured.
    d. Obtain the approval of the millwork Shop Drawings by these related trades (as evidenced by their stamp and signature thereon) before submitting Shop Drawings to the Architect.
14. Coordinate the Shop Drawings with the work of other trades which is a part of, or will be incorporated in the casework, such as glass, inserts, plumbing fixtures, electrical and electronic equipment.

15. Shop Drawings and Calculations: Submit shop drawings and calculations stamped and signed by licensed structural engineer. Submit as deferred permit when required by “authorities having jurisdiction”.

E. Samples:

1. Submit 4 Samples of the following, minimum 8 by 10 inches, or 12 inches long; for joint, complete joint with pieces being joined at least 6 inches long.

   a. Show full range of colors and textures available for each type of finish.
   b. Corner pieces: Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.

2. Full size countertop with end and front splash.
3. Hardware and metal accessories: One finished unit for each type of exposed cabinet hardware and accessories.

F. Qualification Data: For architectural woodwork manufacturer and Installer.
G. Product Certificates: For adhesives.
H. Evaluation Reports: For preservative-treated and fire-retardant-treated wood materials, from ICC-ES.
I. Field quality-control reports.
J. Product Data: Specialty items required by this Section that are not made by the millwork manufacturer.

1. Evidence of no added Formaldehyde panel products.

K. Closeout: Deliver all documentation required herein, including but not limited to

1. WI Certificates of Compliance.
2. As-built Shop Drawings reflecting changes made in the course of the Project.

L. Mockups:

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

1.5 QUALITY ASSURANCE

A. Work shall be in accordance with the NAAWS Premium Grade.
B. Certified Compliance

1. Before delivery to the job site, provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the *NAAWS* Grade or Grades specified.
2. At completion of installation provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and certifying that the installation of these products fully meets the requirements of the *NAAWS* Grade or Grades specified.
3. All fees charged by the Woodwork Institute for its Certified Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

C. Monitored Compliance

1. All millwork and the installation thereof for this project shall be monitored for compliance to the contract documents by a Woodwork Institute Director of Architectural Services.

a. Full particulars of the Woodwork Institute Monitored Compliance Program may be found at the Institute website at www.woodworkinstitute.com or by calling the administrative office at (916) 372-9943.

2. Millwork and/or installation found to be noncompliant (and not corrected) will be rejected.
3. Issuance of a Monitored Compliance Certificate is a prerequisite of acceptance.
4. All fees charged by the Woodwork Institute for its Monitored Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

D. Certified Seismic Installation:

1. Before walls are closed, provide a Woodwork Institute Certified Seismic Installation Program report confirming that backing is provided in all locations required for casework installation, or identifying those locations where backing is missing or improperly located.
2. On completion of installation provide a Woodwork Institute Certified Seismic Installation Program Certificate, identifying the work covered and certifying that installation thereof meets the requirements of the WI CSIP attachment details and schedules.
3. All fees charged by the Woodwork Institute for its Certified Seismic Installation Program are the responsibility of the millwork installer and shall be included in their bid.
4. In the event there is a conflict between the Contract Documents and the CSIP HCAI-approved OPM Drawings, the CSIP HCAI-approved OPM Drawings and Certified Seismic Installation Program shall prevail.

E. Qualification:

1. Firm (woodwork manufacturer) with no less than five years of production experience similar to a specific project, whose qualifications indicate the ability to comply with the requirements of this section.
2. The woodwork manufacturer must have at least one project in the past five years where the value of the woodwork was within 20 percent of the cost of woodwork for this project.

F. Single source responsibility: A single manufacturer shall provide and install the work of described in this section.

1.6 DELIVERY STORAGE AND HANDLING

A. Deliver materials only when the project is ready for installation and the general contractor has provided a clean storage area.

1. Delivery of architectural millwork shall be made only when the area of operation is enclosed, all plaster and concrete work is dry and the area broom clean.
2. Maintain indoor temperature and humidity within the range recommended by the North American Architectural Woodwork Standards for the location of the project.

1.7 SCHEDULING

A. Coordinate fabrication, delivery, and installation with the general contractor and other applicable trades.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. General Performance Requirements: Engineer and provide concealed reinforcement and supports, whether shown in Drawings or not, as required built into the woodwork.
B. General: Provide metal components of woodwork capable of safely withstanding the dead loads of the assemblies, plus the live loads to be subjected to without permanent deformation and without exceeding allowable design working stress of materials involved, including anchors and connections. Apply each load to produce maximum stress in each component.
C. Loads: In the absence of specific design loads on the Drawings and in the Specifications, the provisions of NAAWS" apply to the work of this Section, except use 250 pounds point load for cantilevered countertops from walls and where counters extend beyond the cabinets,
D. Deflection: Limit deflection under uniform load to L/360; L/240 under concentrated load; or 1/8-inch maximum, whichever is more restrictive.

2.2 MANUFACTURER

1. Refer to Materials Legend.

B. Acceptable Fabricators:

1. Brochsteins, Inc., (713) 666-2881.
2. Merritt Woodwork, (440) 942-0205.
3. Or approved equivalent.

2.3 COMPONENTS

A. Lumber: In accordance with the North American Architectural Woodwork Standards Grade specified for the product being fabricated. Moisture Content: 6% to 12% for boards up to 2-inch (50.8 mm) nominal thickness, and shall not exceed 19% for thicker pieces.
B. Core: MDF except at wet locations; meeting the requirements of North American Architectural Woodwork Standards. Wet locations, provide Marine grade plywood.

1. Made with no added urea formaldehyde.
2. Water-resistant core, where required: Particle board meeting the requirements of ANSI A208.1 Grade M3 MR-50 or MDF meeting the requirements of ANSI A 208.2 Grade 155 MR-50.

C. Plastic laminate: High pressure decorative laminate meeting the requirements of the North American Architectural Woodwork Standards for its use.
D. Melamine: Thermally fused laminate conforming to ISO 4586 requirements listed in the NAAWS.

E. Edgeband:

1. Laminate Grade:

a. ABS or PP tape, 0.018 inch minimum thickness; matching the color and pattern of the exposed laminate.

F. Adhesives: Type I, fully waterproof.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in [Section 08 71 00 "Door Hardware."] [Section 08 71 11 "Door Hardware (Descriptive Specification)."]
B. Hardware:

1. Pulls: As indicated on Drawings.
2. Drawer Guides: full extension AWS-approved.
3. Hinges: Concealed European style Grade II hinges minimum 120-degree opening Brand, Model, AWS-compliant.
4. Shelf supports for adjustable shelves in wall-hung cabinets and the upper half of tall cabinets: Designed to prevent shelves from sliding forward in a seismic event.
5. Locks: Provide the following with a minimum of 4 keys per lock.

    a. Door locks: BHMA A156.11, E07121,
    b. Drawer locks: BHMA A156.11, E07041.

6. Door and Drawer Silencers: BHMA A156.16, L03011.

2.5 FABRICATION

A. Exposed exterior surfaces: High-pressure decorative laminate. Color and pattern as selected by the architect.
B. Exposed interior surfaces: High-pressure decorative laminate matching exposed surfaces.

C. Semi-exposed surfaces: Laminate matching exposed surfaces.

D. Cabinet construction type: Frameless.

E. Door Interface Style: Flush overlay.

F. Edgeband:

1. Edgeband at doors, drawer fronts, and false fronts: See 2.2.G above to match millwork.

G. Drawers:

1. Sides: Seven- or nine-ply hardwood plywood with no internal voids.
2. Bottoms: Hardwood plywood of the same species and cut as the drawer sides. Bottoms shall be fully housed into drawer sides, backs, and subfronts, and securely glued.
3. Joinery: Dovetails.

H. Field Cutting of Panels: No field cutting of plastic laminate clad panels will be permitted.
I. Joint Layout: Joints shall be located as shown in the Drawings. Additional joints, not shown in the Drawings, shall not be added, unless specifically approved in writing by the Architect in advance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the adequacy and proper location of any required backing or support framing.

B. Verify that mechanical, electrical, plumbing, and other building components affecting work in this section are in place and ready.

3.2 FIELD QUALITY CONTROL

A. Provide Woodwork Institute Certified Seismic Installation System inspection reports and certificates as specified in part 1 of this section.
B. Concealed Seismic Anchorage: Provide concealed seismic anchorage for all cabinets. Exposed fasteners/anchors are not permitted on exposed or semi-exposed surfaces; conceal as required.

3.3 INSTALLATION

A. Install all work in conformance with the North American Architectural Woodwork Standards, latest edition.

1. Installation shall conform to the NAAWS grade of the items being installed.

B. All work shall be secured in place, square, plumb, and level.
C. All work abutting other building components shall be properly scribed.

1. Scribed Bases: The bases of all woodwork assemblies shall be scribed to the floor.

D. Concealed Fasteners/Anchors: Exposed fasteners/anchors are not permitted on exposed or semi-exposed surfaces; conceal as required.
E. Equipment cutouts shown on plans shall be cut by the installer.
F. “Balanced” Panels: Plastic laminate clad panels are to be “balanced” with equal thicknesses of laminate on both front and back sides. All exposed and semi-exposed outside corners shall be laminated over hardwood.
G. Joint Layout: Joints shall be located as shown in the Drawings. Additional joints, not shown in the Drawings, shall not be added, unless specifically approved in writing by the Architect in advance.

3.4 ADJUSTING AND TOUCH UP

A. Before completing installation, the installer shall adjust all moving and operating parts to function smoothly and correctly.
B. All nicks, chips, and scratches in the finish shall be filled and retouched. Damaged items that cannot be repaired shall be replaced.

3.5 CLEANUP

A. Upon completion of installation, the installer shall clean all installed items of pencil and ink marks and broom clean the area of operation, depositing debris in containers provided by the general contractor.

END OF SECTION

SECTION 06 42 23 – SLATWALL PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Pre-finished slatwall panel system for merchandise displays. As shown in drawings.
2. Fasteners and other miscellaneous supports and accessories required for a complete installation.

1.2 SUBMITTALS

A. Samples: 24 inches square samples of each panel type, and full-size samples of fasteners. Approved samples will serve as Architect’s control samples.
B. Shop drawings: Large scale, dimensioned shop drawings showing panel layouts and attachment details.
C. Data:

1. Manufacturer product specifications and installation instructions for materials.
2. Instructions for cleaning panels.
3. Instructions for precautions against materials and methods which may be detrimental to finishes.

D. Closeout:

1. Maintenance stock for each panel type, consisting of 1 full-size panel taken from the same "run" as those used for the Project.
2. Carefully pack the maintenance stock in heavy cardboard cartons, with the contents clearly marked. Include complete manufacturer's cleaning instructions.

E. Maintenance Data: Submit manufacturer’s care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.3 QUALITY ASSURANCE

A. Code compliance: Materials shall be tested, listed and labeled for flammability, combustibility, and smoke developed by a testing agency approved by the authorities having jurisdiction.
B. Manufacturers Qualifications

1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.

1.4 HANDLING

A. Coordinate the delivery of the panels with their installation to minimize storage periods at the site.

B. Deliver systems and specified items in manufacturer's standard protective packaging.
C. Open packaging promptly after deliver and inspect panels carefully. Contact Freight carrier if damaged in transit. Contact manufacturer for replacement order.
D. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.
E. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.
F. Before installing panels, permit them to reach room temperature.

1.5 JOB CONDITIONS

A. Environmental Limitations: Do not install panels until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
B. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Slatwall Display panels by Slatwall Systems (Basis of Design).
B. Slatwall Display panels by Marlite.
C. Slatwall by Spacewall International.
D. Or equal.

2.2 MATERIALS

A. All slatwall panels shall be constructed utilizing a ¾ inch, 48# density medium density fiberboard (MDF) substrate, having an internal bond strength of 110# per square inch minimum. Slatwall panels shall have formaldehyde emissions of .3 PPM or less and shall comply with HUD 24 CFR Part 3280 Standards set fourth for particleboard panels.

1. Panels shall not have any added urea-formaldehyde.
2. Flame Spread: 200, maximum, when tested in accordance with
3. ASTM E 84-94 (Class C, Class III).
4. Inner Bond Strength: 100 psi to 105 psi average.
5. Modulus of Rupture: 3500-4000 psi
6. Modulus of Elasticity: 350,000-400,000 psi
7. Linear Expansion: 0.24-0.30 percent.
8. Screw Holding Strength at Edge: 250-275 pounds
9. Screw Holding Strength at Face: 300 pounds
10. Moisture Content: 4 to 8 percent.
11. Thickness Tolerance: plus/minus 0.005 inch.
12. Length and Width Tolerance: Plus/Minus 0.0625 inch.
13. Squareness Tolerance: 0.0156 inch per linear foot.

B. Slatwall panels shall have engineered "T" grooves factory machined and extruded aluminum channels.

1. Series: To Be Determined.

C. Slatwall panels shall have surface (face) finish.

2.3 FABRICATION

A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.
B. Comply with manufacturer's written recommendations for fabrication.
C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.

1. Sawing: Select equipment and blades suitable for type of cut required.
2. Drilling: Drills specifically designed for use with plastic products.
3. Milling: Climb cut where possible.
4. Routing
5. Tapping

D. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.
E. Tolerances for panels:

1. Dimensional: 0.0625"
2. Squareness: 0 .125" across diagonals
3. Thickness: 0.008"
4. Grooving:: 0.031" (groove width and spacing between grooves)

2.4 SLATWALL TYPE:

A. To Be Determined.

2.5 GROOVE FINISH:

A. Extruded aluminum T-shaped insert; mill-fished.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
B. Cleaner: Type recommended by manufacturer.
C. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.
D. Bonding Cements: May be achieved with solvents or adhesives, suitable for use with product and application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions proceeding with installation.

3.2 INSTALLATION

A. Comply with the panel manufacturer instructions, the approved shop drawings, and the following:

1. If panels must be cut to shorten, cut from bottom of lowest panel on wall.
2. Install panels plumb, level, with hairline, flush joints, undamaged edges, and in alignment with other panels.
3. Use a bead of adhesive the full width of the panel at each stud location.
4. Locate panel ends over studs.
5. Screw panels to every other stud and not more than 12 inches on center vertically; install screws in grooves. Flathead, 1-1/2 inches center vertically; install screws in grooves. Flathead, 1-1/2 inches long, minimum.

3.3 FIELD QUALITY CONTROL

A. Clean soiled or discolored surfaces after installation. Remove damaged or improperly installed units and replace with new panels.

3.4 CLEANING AND PROTECTION

A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect’s satisfaction.

END OF SECTION

SECTION 06 82 00 - FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Fiber glass reinforced (FRP) human figures and flamingos.
2. Structural design and calculations.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing
B. Preinstallation meeting:

1.3 SUBMITTALS

A. Data: Manufacturer's technical data and installation instructions for each type of FRP fabrication required.
B. Shop drawings: Include elevations, sections, and large-scale details. Show anchorage and accessory items. Furnish location template drawings for fabrications supported or anchored to other construction.
C. Samples:

1. Preliminary Samples, 12-inches by 12-inches, showing proposed textures.
2. Paint color Samples.

D. Schedule: Of FRP fabrications.
E. Structural calculations: As specified.

1.4 QUALITY ASSURANCE

A. Engineering criteria:

1. The Contractor shall be responsible for the engineering, fabrication and installation of the FRP fabrications, their reinforcement, and their connections to the structure, within the physical limitations indicated on the Drawings.
2. Loads use in engineering shall be those prescribed by Code.
3. When so required, Contractor shall obtain Building Department approval of the FRP fabrications Shop Drawings and calculations, and pay fees incurred thereby before start of installation.
4. Fasteners and connections are shown schematically. A California-licensed professional engineer, employed by the Contractor, shall determine final types and sizes.

    a. Fasteners or connections shall not conflict with or require revision of the finish profiles of the fabrications or the supporting work.
    b. Connections to the structural frame shall not impose any eccentric loading, or induce twisting or warping.
    c. Connections to the structural frame shall be able to accommodate misalignment of the steel structure within limits allowed by the AISC tolerances.

B. Manufacturer's qualifications:

1. Firm with a demonstrated capability to produce fabrications of the quality and scope required for the Project, with an industry involvement of at least 5 years.
2. When requested, submit the following:
    a. Written evidence of having experienced personnel, physical facilities, established quality control procedures, and a management capability sufficient to produce the required units without causing delay of the Project.
    b. Evidence of compliance with paragraph 1 above.

C. Erector's qualifications: Manufacturer or firm regularly engaged for at least 5 years in erection of FRP fabrications similar to those required for the Project.
D. Welders' qualification: Qualified in compliance with AWS D1.1.
E. Uniformity: Provide fabrications of a single manufacturer.
F. Coordination: Before starting full size fabrication, models must be reviewed and acceptable to the Architect. Make models available within a 50-mile radius of the Architect’s office.

1.5 HANDLING

A. Packaging: Pack, wrap, crate, bundle, or otherwise package, handle, transport, and store fabricated work as necessary to provide protection from damage.
B. Protecting: Protect surfaces from damage.

1.6 WARRANTY

A. Warrant this work against defective materials, workmanship, and design for 5 years from Substantial Completion.
B. Fading, cracking, warping, peeling, delaminating, rusting, corroding, and structural failure, including distortion by whatever cause, shall be construed to mean failure because of faulty materials and workmanship.
C. Failures during the warranty period shall be repaired or replaced at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel shapes: ASTM A 36 hot-rolled, or cold-rolled shapes, plates and tubes in sizes required to meet design criteria.
B. Fiber reinforced polyester (FRP): Also referred to as fiberglass reinforced plastic, fiber reinforced plastic, and fiberglass. Made with random chopped or hand-applied fiberglass reinforcement impregnated with isophthalic thermo-setting resin to form molded, seamless construction.

    1. Resin: Commercial grade acceptable for the environment. The resin shall not contain fillers except for fire-retardancy and as may be required for viscosity control.
    2. Fiber reinforcement: Commercial grade glass fiber having a coupling agent capable of producing a suitable bond with the resin.
    3. Colored coatings: Non-fading coating system, recommended by FRP manufacturer for optimum adherence to substrate.

C. Fasteners: Metals which are non-corrosive to FRP and mounting surface.
D. Anchors and inserts:

    1. Hot-dip galvanized steel anchors and inserts.

2. Toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.2 FABRICATION

A. Lay-up molds: Provide substantial materials and construct molds and formwork to accurately reproduce designs indicated on Drawings and approved Shop Drawings.
B. Laminate: The laminate shall consist of an inner surface, an interior layer, and an exterior (layer) laminate body.

1. Minimum wall thickness shall be as required to provide adequate structural strength, but in no case less than 3/16 inch.
2. All reinforcement shall be completely wetted. Dry reinforcement, as shown by white laminate shall be considered an internal defect, and shall be repaired.
3. Finished surfaces shall be smooth, or have textures as approved by the Owner. Finish surfaces shall be free of voids, pits, cracks, crazing, pinholes, exposed fibers or evidence of extreme exotherm.
4. Stagger laps in adjacent plies approximately 4-inches.
5. Laminate surfaces shall have a Barcol hardness of at least 90 percent of the resin manufacturer's minimum specified hardness for the cured resin.

C. Structural reinforcing: Provide required reinforcing. Refer to Article 1.03.

2.3 FINISHING

A. Preparation of FRP for painting.

1. After FRP units have been removed from the molds, prepare units for painting and finishing in compliance with the paint or coating manufacturer's printed instructions.
2. Remove fins and ragged edges.

B. Painting: Apply paints in accordance with their manufacturers' instructions. Match selected colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify conditions and measurements affecting the work of this Section at site. Make sure that detrimental conditions are corrected before proceeding with installation.

3.2 INSTALLATION

A. Install fabrications level, plumb and at height indicated, with surfaces free from distortion and other defects.
B. Anchor securely to supports as indicated on Shop Drawings.
C. Joint finishing:

1. Fit FRP units as tightly together as possible along joint lines.
2. Where backsides of joints are accessible, back-up joints with 3/4-oz./sq.-foot of mat and resin, and fill joints with resin paste.
3. Where butt joints result in a gap less than 1/4-inch at its widest point, fill the opening with resin paste.

4. Where butt joints result in a gap 1/4-inch or wider at its narrowest point, fill the opening with chopped strand and resin paste.
5. Finish all joint surfaces, including screw fastener depressions, to match adjacent FRP unit surfaces.
6. Where FRP unit abuts to another material, seal joints continuously with a paintable latex-base sealant as specified in Section 07920.

3.3 CLEANING

A. Clean fabrications of foreign material without damaging finished surfaces.
B. Hand-rub smooth surfaces with polishing cream.
C. Clean fabrications in accordance with fabricator’s instructions.

3.4 PROTECTION OF FINISHED WORK

A. Protect finished work from damage.
B. Place protective structural covering over installed units.

END OF SECTION

DIVISION 07

THERMAL & MOISTURE PROTECTION

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SECTION 07 05 53 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.2 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Paint finish.

1.3 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.
C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.
D. Samples: Submit two samples of each type of marking proposed for use, of size similar to that required for project, illustrating font, wording, and method of application.

1.4 QUALITY ASSURANCE

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

1.5 FIELD CONDITIONS

A. Do not install adhered markings when ambient temperature is lower than recommended by label or sign manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Partition Identification Labels:

1. Fire Wall Signs, Inc: www.firewallsigns.com.
2. Safety Supply Warehouse, Inc: www.safetysupplywarehouse.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of the building code.
B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl or paper sign with factory applied adhesive backing.
C. Languages: Provide sign markings in English.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Locate markings as required by CISPI 301 Section 703.7.
B. Install adhered markings in accordance with manufacturer's instructions.
C. Install neatly, with horizontal edges level.
D. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 21 00 - THERMAL BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes thermal insulation at locations specified below in and the following:

1. Thermal insulation (batts) between studs in exterior walls.
2. Thermal insulation (batts) in soffits where indicated.

B. Insulation location: As a minimum, provide thermal insulation for the building envelope, as defined below

1. Building envelope (all exterior walls but excluding roof insulation specified elsewhere, at parapets and openings in walls, including louvers (where no blank-off panels occur), vision glass and doors).
2. Exterior soffits of air-conditioned spaces.

C. Related requirements:

1. Division 07 for roof insulation.
2. Other Section of Division 07 for firestopping, including fire safing insulation.
3. Division 09 for acoustical insulation.
4. Division 22 for pipe and duct insulation.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Sequence and coordinate application of insulation with related work to comply with the following.

1. Provide temporary enclosures to prevent deterioration of insulation exposed to unfavorable environmental conditions.
2. After its application, avoid unnecessary exposure of insulation to damage during construction operations.
3. Do not install enclosing or concealing construction until after insulation is installed, inspected, tested, and corrections are made to provide an uninterrupted thermal barrier.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data for materials specified.
B. Shop Drawings:

1. Show each type of insulation, indicating type and manufacturer, location, extent, material, insulating value, and method of attachment.
2. Submit color-coded floor plans supplemented by elevations showing the location of each type of insulation. Identify material, manufacturer, thickness, R value, and method of fastening where applicable.

C. Samples:

1. 24 inches square Samples of each type of insulation.
2. Twelve inches long Samples of tape.

1.4 HANDLING

A. Packaging: In unopened containers and packages with labels bearing producer(s) name and source of product, date of manufacture, with UL classification on package, and R value.
B. Storage:

1. Keep insulation protected while stored; keep dry during and after installation.
2. Outdoors, store off ground on pallets, protected with breathing type covers.
3. Insulation shall be dry when installed.
4. Remove insulation that becomes wet or damp immediately from the job site.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Install insulation in dry weather, unless building is enclosed and watertight.
B. If insulation will be exposed to the elements after installation, cover with waterproof membrane each day; do not enclose wet insulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Fiber glass batt insulation: One of the following, or equal.

1. Owens Corning.
2. CertainTeed.
3. Knauf Insulation.
4. Johns Manville.

B. Mineral wool insulation: One of the following, or equal.

1. Thermafiber (basis of design).
2. Rockwool Group.
3. Partek Insulations, Inc.
4. Rock Wool Manufacturing Co.
5. Fibrex Insulation, Inc.
6. Industrial Insulation Group, LLC.

C. Polyiso board insulation for use on above grade walls: One of the following Non-ODP, Low GWP and formaldehyde-free, complying with ASTM C578, Type XV..

1. Glass-Fiber-Mat Faced: ASTM C1289, glass-fiber-mat faced, Type II, Class 2, Grade 2 (20 psi).
    a. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

1. Manufacturers:

   a. Enverge CI foil faced by Firestone.
   b. Hunter Xci CG by Hunter Panels
   c. EnergyShield CGF Pro by Atlas.

D. Foamed-in-place insulation: As specified below.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Comply with these Specifications for thermal resistance, and to the Drawings for maximum or minimum thickness of insulation required.

1. Provide the thermal resistance (R value) indicated to limit building thermal gains and losses.
2. Select appropriate products from list of materials to provide (a) the specified thermal value for the building envelope, (b) compatibility when incorporated into finished system while ensuring substrate conditions as well as their ability to adhere components permanently, where applicable, in rigid manner, and (c) maintain flexibility where required in finished work.
3. Provide insulation materials and their facings that do not support fungal growth when tested in accordance with ASTM C1338.

2.3 THERMAL INSULATION

A. Thermal resistance (“R” value): Minimum of 19, except as noted.
B. Sprayed foam sealant: Fire-rated polyurethane foam insulation meeting ASTM E 84, one- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 pcf density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

1. Dow.
2. Tiger Foam Insulation.
3. Fomo Products, Inc., or equal.

C. At all other locations:

1. Type: Glass fiber or mineral wool batt or blanket insulation complying with ASTM C 665, Type III, Class A, flame spread (FSK) 25 or less, formaldehyde-free by Johns Manville, Knauf, or equal.
2. Width: Batt width shall match the stud spacing and be sized for a friction-fit to be self-supporting.

2.4 INSTALLATION MATERIALS

A. Insulation tape:

1. Polyethylene Adhesive Tape: “Scotch brand No. 483” by 3M.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.
C. Before installing insulation in stud walls, thoroughly vacuum space clean of dust and debris. Also clean spandrel cavities in the same manner.

3.2 INSTALLATION

A. Install insulation where shown and specified. Cut to fit irregular spaces, butt edges into firm contact with each other and adjoining surfaces.

1. Fill with foam insulation or hand pack around pipes, ducts, conduits, electrical boxes, and other penetrations as required to thoroughly fill all voids and spaces between framing members and to form a continuous thermal barrier.
2. Do not compress insulation more than 10 percent.
3. Where door and window frames occur in insulated assemblies, cut additional strips of insulation and hand-pack in and around the frames or use foam insulation to fill all voids.
4. Insulate boxed headers and studs in exterior walls.
5. Use foam insulation for small spaces that are difficult to insulate otherwise. Fill space completely and trim insulation flush with face of wall when cured.
6. Comply with the National Electrical Code (NEC) for installation in proximity to light fixtures. Do not install insulation closer than recommended by NEC.
7. Where in-wall electrical conduit is parallel to the wall, slit the insulation halfway to bury the conduit in it. Where the conduit is perpendicular to the wall, do not oversize the penetration; tape the conduit to prevent heat leakage.
8. Install foil-faced insulation with foil facing the building interior.

B. Batt insulation in stud walls:

1. Install wall insulation with aluminum foil facing interior of the building, with a friction fit to studs, short joints closely butted, and with joints square, straight without warp or twist.
2. Cut and fit insulation to closely fit intersecting or penetrating surfaces.
3. Leave no voids in completed installation.
4. Provide insulation to meet the overall thermal resistance requirements of the exterior wall enclosure.

C. After installation is complete and before concealing, seal joints between insulation, between insulation and intersecting or penetrating surfaces and between insulation and perimeter surfaces with 4-inch wide vapor-proof aluminum colored tape applied on the aluminum foil facing side. Seal fastener punctures with aluminum colored vapor-proof mastic or use tape used for sealing joints.

3.3 FIELD QUALITY CONTROL

A. Prior to closing-in of insulated assemblies, or prior to Substantial Completion for insulation that will remain exposed in the building, refit, reinstall and/or replace wet, damaged and displaced insulation.

END OF SECTION

SECTION 07 26 16 - BELOW GRADE VAPOR RETARDER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vapor retarder (VR) under new building concrete slabs-on-grade for interior slabs.
B. Related requirements:

1. Section 03 30 00 for substrate under VR.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing: Schedule and sequence installation of VR to minimize exposure to construction traffic.

1.3 SUBMITTALS

A. Data:

1. Manufacturer Product Data, specifications, typical installation details and other data necessary to demonstrate vapor retarder compliance with the specified requirements.
2. Summary of test results, ASTM E 1745.

B. Samples: 24-inch square Samples of vapor retarder with a taped joint at third point.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Vapor retarder: By Reef Industries, Inc., or equal by one of the following complying with ASTM E 1745 Class A, and the values given below.

1. Fortifiber Corp.
2. WR Meadows.
3. Raven Industries.
4. Stego Industries, LLC.
5. Insulation Solutions.

2.2 PERFORMANCE REQUIREMENTS

A. Vapor retarder:

1. Material: 7-ply laminate, combining 4 layers of high-density polyethylene and 3 high-strength non-woven cord grid.
2. Weight: 82 lb/1,000 square feet when tested in accordance with ASTM D 3776.
3. Puncture propagation Tear: 55 lb when tested in accordance with ASTM D 2582.

4. Permeance (Perm): 0.019 grains/hr-sq ft-in Hg when tested in accordance with ASTM E 96.
5. Drop dart: 2300 g, when tested in accordance with ASTM D 1709.
6. Tensile strength: 275 lb/5,464 psi when tested in accordance with ASTM D 882, 3-inch-wide specimen.
7. Puncture strength: 72 lb when tested in accordance with ASTM D 4833.
8. Classification: Class A, when tested in accordance with ASTM E 1745.
9. Usable temperature range: Minus 45 to 170 degrees F.

2.3 MATERIALS

A. Vapor retarder: “Griffolyn Type 105”
B. Sealing material: Mastic, adhesive or pressure-sensitive adhesive tape recommended by the vapor retarder manufacturer.

1. VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Repair tape: Self-adhesive tape recommended by vapor retarder manufacturer to repair holes in membrane by jobsite activities.

1. VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Pipe boots: Of sizes indicated, compatible with vapor retarder and adhesive materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions affecting the work of this Section at the site.
B. Verify below-grade work and items penetrating moisture retarder are complete.
C. Verify that subgrade is level and compacted to 95 percent maximum density, determined in compliance with ASTM D 1557.
D. Correct detrimental conditions before proceeding with installation.

3.2 SAND BEDDING

A. Cover subgrade with a minimum 4-inch layer of sand.
B. Work to fill voids; vibrate to compact and leave with finished surfaces reasonably uniform at established grade.

3.3 VAPOR RETARDER

A. Cover s bed with the vapor retarder.
B. Endeavor to tie new VR into existing VR where the existing slab has been removed.
C. Comply with ASTM E 1643 and the following:

1. Layout to minimize running and side joints with long dimension parallel with the direction of the pour.

2. Spread sheeting over undamaged vapor retarder, smooth and even; lap edge and end joints 6 inches; turn-up perimeters against concrete walls/footings to top of future slab and tape continuously to clean, dry concrete so that neither the tape nor the vapor barrier is visible when the slab is cast.
3. Offset intermediate end joints in adjacent sheets 4 feet minimum.
4. Seal laps and perimeters using continuous beads or strips of sealing material applied to bottom layer or tape. When using sealing material, apply top layer and press sufficiently to assure complete contact.

D. Penetrations:

1. Cut sheeting to fit closely and neatly.
2. Slip sheeting over penetrations where possible, otherwise slit from penetration hole to nearest edge.
3. Seal pipe penetrations with prefabricated boots made from vapor retarder and seal tight with tape to the vapor retarder.
4. Seal edges continuously around penetrations.
5. For smaller penetrations, repair slits with 12-inch wide strips of sheeting set centered on slit and sealed on each side.

E. Cuts and accidental tears: Repair with tape, or if too large, with patches of the vapor retarder continuously taped.

END OF SECTION

SECTION 07 27 13 - SELF-ADHERED WATER-RESISTANT BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-adhered vapor permeable air and water barrier membrane (A&WBS) system on above-grade exterior wall surfaces, except where doors and glazed assemblies occur, including bridging and sealing air leakage pathways in roof, and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assemblies.

B. Related requirements:

1. Division 06 for sheathing
2. Other Sections of Division 07 for the following:
    a. Section 07 54 19 Thermoplastic PVC Roofing.
    b. Section 07 62 00 Flashing and Sheet Metalwork.
    c. Section 07 92 00 Joint Sealers.
3. Section 09 24 00 Lath and Portland Cement Plaster.

1.2 DEFINITIONS

A. Air and water barrier assembly: Air and water barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall and prevent water leakage in the wall.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing: Schedule the work of this Section so the A&WBS exposure to the elements is kept to a minimum and does not exceed time period recommended by its manufacturer but no more than 150 days prior to enclosure.

B. Coordination:

1. Notify concerned trades of items required to be incorporated into work of separate Sections. Certain components specified under this Section include items which are closely integrated with A&WBS transitions, entrances, glazed assemblies, glazing components, flashing pieces and architectural metalwork specified in other Sections and consequently require close coordination with such allied trades. Perform coordination required to ensure correct installation procedures and results.
2. Coordinate and cooperate with other trades and determine where and when phased installation of A&WBS will be necessary as well as its extent; document in writing and have all affected trades sign the document before submitting one copy to the Architect.

C. Pre-installation meetings: Prior to beginning installation of A&WBS, hold a pre-installation conference to review work to be done.

1. Contractor, Architect, installer, membrane system manufacturer's representative, and other trades who have materials penetrating membrane system or finishes covering membrane system shall be present.

    a. Contractor shall notify participants at least 7 days prior to time for conference.
    b. Contractor shall record minutes of meeting and distribute to attending parties.

2. Agenda: As a minimum discuss the following.

    a. Surface preparation.
    b. Substrate condition and pretreatment.
    c. Minimum curing period when A&WBS is applied to concrete.
    d. Special details and sheet flashing.
    e. Sequence of construction, responsibilities, and schedule for subsequent operations.
    f. Installation procedures.
    g. Inspection procedures.
    h. Protection and repair procedures.
    i. Review and approval of all glazing applications.

3. Record meeting minutes and distribute PDF copy to all concerned, including the Architect, within 48 hours of the meeting.

1.4 SUBMITTALS

A. Data: Manufacturer Product Data for each type of material. Including the following.

1. Application instructions.
2. Instructions for evaluating, preparing, and treating substrates.
3. Temperature and other limitations of installation conditions.
4. Technical data and tested physical and performance properties.
5. Certification of compatibility, listing all materials on the Project that the specified materials come in contact with.

B. Shop Drawings: Large scale (minimum 4:1 for details, 1:48 for elevations), dimensioned Shop Drawings specific to the Project to supplement Manufacturer Data. Show the following.

1. Locations and extent of A&WBS.
2. Details of typical and atypical conditions.
3. Intersections with other envelope systems and materials.
4. Membrane counterflashings.
5. Details showing bridging gaps in the construction, treatment of inside and outside corners and sealing of miscellaneous penetrations.

C. Test results:

1. Air permeability testing of primary A&WBS material in accordance with ASTM E 2178.
2. ABAA test protocol for the A&WBS system.
3. Adherence to fluid-applied membrane air barriers.

D. Samples: Minimum 6-inch square Samples of each A&WBS material required for the Project.
E. Installer qualifications: Written approval from the A&WBS manufacturer that the applicator of the system is qualified for the work of this Section.

F. Certification: From an approved independent testing laboratory certifying that the air leakage rates of the membrane, including primary membrane and transition sheets, does not exceed the requirements of the Massachusetts Energy Code.
G. Warranty: Sample copies of warranty for the A&WBS, clearly defining terms, conditions, and time periods for the warranty.
H. Letter of acceptance: From the manufacturer to verify its acceptance of the applicator and acceptance of substrates as satisfactory to receive this work.

1.5 QUALITY ASSURANCE

A. Source limitation: Obtain primary air-barrier material and through wall flashing through one source from a single manufacturer.
B. Applicator qualifications: Firm experienced in applying A&WBS materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
C. Mockup: Before starting work of this Section, provide barrier work for exterior wall assembly mockup specified elsewhere, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of barrier membrane.

1. Coordinate construction of mockup to permit inspection by Owner's testing agency of barrier before external insulation and cladding is installed.
2. If Architect determines mockup does not comply with requirements, reconstruct mockup(s) and re-apply barrier until mockup is approved.
3. Accepted mockup may remain a part of the Work when properly identified and protected.

1.6 HANDLING

A. Deliver materials and products in labeled packages.
B. Store and handle in compliance with their manufacturer’s instructions and recommendations.
C. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
D. Remove damaged material from the site.

1.7 PROJECT CONDITIONS

A. Apply A&WBS within the range of ambient and substrate temperatures recommended by barrier manufacturer.
B. Protect substrates from environmental conditions that affect performance of air and water barrier.
C. Do not apply barrier to a wet substrate or during rain, fog, or mist.

1.8 SPECIAL WARRANTIES

A. Provide the following warranties for 5 years after Substantial Completion:

1. Material warranty: Manufacturer standard form in which manufacturer agrees to replace fluid-applied barrier membrane materials that fail within specified warranty period when installed and used in conformance with manufacturer's instructions.
2. Workmanship warranty: Installer warranty, in form acceptable to the Owner, agreeing to replace fluid-applied membrane that fails within specified warranty period when installed and used in conformance with its manufacturer's instructions.

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

   a. Failure to remain watertight.
   b. Failure to maintain air permeance rating not to exceed 0.004 cfm/square foot when tested per ASTM E 2178, within specified warranty period.
   c. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ATM E 96, Method B.

PART 2 - PRODUCTS

2.1 MANUFACTURER/TYPE

A. Membrane:

1. Basis of design is Perm-A-Barrier VPS by GCP Applied Technologies (breathable).
2. RevealShield SA by VaproShield.
3. Or equal.

2.2 PERFORMANCE REQUIREMENTS

A. A&WBS shall be capable of performing as a continuous vapor-permeable A&WBS and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration.
B. A&WBS shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
C. The A&WBS shall have the following characteristics:

1. It must be continuous, with all joints made airtight.
2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf), when tested in accordance with ASTM E 2178.
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. It shall be durable or maintainable.

D. The A&WBS shall be joined in an airtight and flexible manner to the A&WBS material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep.
E. Make connection between:

1. Foundation and walls.
2. Walls and windows or doors.
3. Different wall systems.
4. Wall and roof.
5. Wall and roof over unconditioned space.
6. Walls, floor and roof across construction, control and expansion joints.
7. Walls, floors and roof to utility, pipe and duct penetrations.

F. Penetrations of the A&WBS and paths of air infiltration/exfiltration shall be made airtight.

2.3 MATERIALS

A. Self-adhered air barrier membrane: Perm-A-Barrier VPS by GCP Applied Technologies s.
B. Product shall have the following minimum physical properties:

1. Air Permeance, ASTM E2178: Not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf) (equal to 0.02L/sq. m @ 75 Pa)
2. Assembly Air Permeance, ASTM E2357: Not to exceed 0.04 cfm/sq.ft. under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.2 L/sq.m @ 75 Pa)
3. Water Vapor Permeance, ASTM E96: Not less than 15 perms
4. Water Resistance, AATCC-127: No less than 5 hrs at 55 cm/21 inch
5. Breaking Force, ASTM D5034: 55 lbf MD, and 44 lbf CD
6. Pull Adhesion, ASTM D4541: min. 15 psi to primed glass faced gypsum sheathing, min. 12 psi to primed CMU
7. Peel Adhesion, ASTM D903: min. 5 pli to primed glass faced gypsum sheathing, min. 4 pli to Perm-A-Barrier® VPS, min. 2.5 pli to primed CMU
8. UV Exposure Limit: Not more than 150 calendar days
9. Water Penetration Resistance Around Nails, ASTM D1970 Modified: Pass
10. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

C. Transition membrane: Perm-A-Barrier Detail Membrane by GCP Applied Technologies ; a 36-mil self-adhesive rubberized asphalt integrally bonded to 4-mil of cross-laminated, high-density polyethylene film to provide a minimum 40-mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:

1. Water Vapor Transmission, ASTM E96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
2. Air Permeance at 75Pa (0.3 in. water) pressure difference: 0.0006 L/(s.m2) (0.00012 cfm/ft2) max.
3. Puncture Resistance, ASTM E154: 178 N (40 lbs.) min.
4. Lap Adhesion at 25ºF, ASTM D1876: 5.0 lbs./inch of width
5. Low Temperature Flexibility, ASTM D1970: Unaffected to minus 45ºF
6. Tensile Strength, ASTM D412, Die C Modified: min. 400 psi
7. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: minimum 200%.

D. Transition aluminum membrane: Perm-A-Barrier Aluminum Flashing by GCP Applied Technologies; 35-mil of self-adhesive rubberized asphalt integrally bonded to 5 mil (0.1 mm) of aluminum film to provide a minimum 40-mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:

1. Liquid Membrane for Details and Terminations: Bituthene Liquid Membrane manufactured by GCP Applied Technologies s; a 2-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/L max. VOC content.
2. Substrate Patching Membrane: Bituthene Liquid Membrane manufactured by GCP Applied Technologies s; a two- part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/L max. VOC content.
3. Joint Sealant: Refer to sealant manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with manufacturer's recommendations and other conditions affecting performance.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by A&WBS manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

B. Correct detrimental conditions before proceeding with installation.

3.2 SURFACE PREPARATION

A. General:

1. Comply with the A&WBS manufacturer's requirements for preparation of substrates so they are sound and free of voids and sharp protrusions.
2. Remove contaminants such as grease, oil and wax from exposed surfaces.
3. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied barrier system.
4. Provide clean, dust-free, and dry substrate for barrier application.
5. Mask adjoining surfaces not covered by barrier to prevent spillage and overspray affecting other construction.

B. Gypsum sheathing panels:

1. Verify that the boards are sufficiently stabilized with corners and edges fastened.
2. Pre-treat board joints with 2 to 3 inches wide manufacturer's recommended self-adhesive tape.
3. Fill gaps greater than 1/4-inch wide with mastic or calk, allowing sufficient time to fully cure before taping.
4. Tape joint prior to installing fluid barrier membrane.

C. Treat construction joints and install flashing as recommended by manufacturer.
D. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
E. Cover gaps in substrate and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for the barrier.

3.3 A&WBS INSTALLATION

A. Comply with the A&WBS manufacturer's instructions.
B. Install A&WBS on dry surfaces when air and surface temperatures are 40-degree F and above.
C. Prime substrate to receive A&WBS.
D. Precut pieces of air barrier into easily handled lengths.
E. Remove release linear and position membrane carefully before placing against the surface.

F. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.
G. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after placement.
H. Overlap adjacent pieces 2 inches and roll seams.
I. Position subsequent sheets of membrane above immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 2 inches. Roll firmly into place.
J. Seal around masonry reinforcing or ties and penetrations with penetration & termination sealant.
K. Coordinate the installation of air barrier with roof installer to ensure continuity of membrane with roof membrane.
L. At end of each working day seal top edge of A&WBS to substrate with termination sealant.
M. Inspect installation prior to enclosing and repair punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 6 inches) in all directions from the perimeter of the affected area.

3.4 TRANSITION MEMBRANE

A. Install strips, transition membrane, and auxiliary materials according to the A&WBS manufacturer's instructions to form a seal with adjacent construction and to maintain a continuous air and water membrane.

1. Coordinate the installation of the A&WBS with installation of roofing membrane and base flashing to ensure continuity of barrier with roofing membrane.
2. Install strip on roofing membrane or base flashing so that a minimum of 3-inch of coverage is achieved on both substrates.
3. Install flashings only after application of A&WBS.

B. Apply primer to substrates to receive transition membrane at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.

1. Prime gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.

    a. Connect and seal A&WBS continuously to roofing membrane, floor-to-floor construction, exterior glazed assemblies, door framing, and other openings in exterior walls, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
D. Prime concealed perimeter of exterior glazed assemblies and doors. Apply transition strip so that a minimum of 3-inch of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than one-inch of full contact.
E. Roll transition membrane firmly to enhance adhesion.
F. Fill gaps in perimeter frame surfaces of glazed assemblies, doors, and miscellaneous penetrations of barrier membrane completely with foam sealant.
G. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FIELD QUALITY CONTROL

A. Testing agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
B. Inspections: Barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following.

1. Continuity of barrier system is achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of barrier system is provided.
3. Site conditions for application temperature and dryness of substrates are maintained.
4. Maximum exposure time of materials to UV deterioration is not exceeded.
5. Surfaces have been primed, if applicable.
6. Laps in strips and transition strips comply with minimum requirements and are shingled in the correct direction (or mastic is applied on exposed edges), with no fishmouths.
7. Termination mastic is applied on cut edges.
8. Strips and transition strips are firmly adhered to substrate.
9. Compatible materials have been used.
10. Transitions at changes in direction and structural support at gaps are provided.
11. Connections between assemblies (membrane and sealants) comply with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
12. All penetrations are sealed.

C. Tests: Testing may be performed and will be determined by Owner's testing agency for evidence of air leakage according to ASTM E 1186, smoke pencil with pressurization or depressurization.
D. Deficiencies:

1. Do not cover barrier until it is tested and inspected by Owner's testing agency, unless Owner decides not to have tests performed in which case cover barrier after work is reviewed and found acceptable.
2. Correct deficiencies in or remove barrier components that do not comply with specified requirements; repair substrates and reapply.

3.6 CLEANING/PROTECTING

A. Protect barrier system from damage during application and remainder of construction period, according to its manufacturer's instructions.
B. Protect barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace barrier exposed to UV for more than 150 days.
C. Clean spills, stains, and soiling from construction that will be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
D. Remove masking materials after installation.

END OF SECTION

SECTION 07 32 13 -CLAY ROOF TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Tile roofing underlayment and flashing.
2. Clay tile roofing.
3. Fasteners, mortar and accessories.
4. Supervise installation of/or install metal flashings at tile roofing to assure a watertight system..

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for tiles, including recommended installation instructions.
B. Shop Drawings: Large scale Shop Drawings of the metal flashings incorporated in the tile roofing or to be installed at the perimeter of the tile roofing, unless those Shop Drawings are furnished under Section 07 60 00.
C. Samples: Full-size tile Samples of each tile profile showing the full range of colors to be expected in the Work.

1.3 QUALITY ASSURANCE

A. Tile blending: Factory-blend tile and package accordingly so that tiles taken from one pallet show the same range in colors as those taken from other pallets and match approved Samples.
B. Field mockup: Prior to installation, assemble a mockup of the roof tile to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockup to comply with the following requirements, using materials specified.

1. Locate mockup on site where directed. Make mockup approximately 10-foot square with one ridge, rake and eave condition.
2. Obtain Architect's acceptance of mockup before starting final roof tile work.
3. Accepted mockup in undisturbed condition at time of Substantial Completion may become part of completed Work, if it can be tied-in seamlessly with the remainder of the roof tile installation.

C. Installer’s qualifications:

1. Firm specialized in the installation of tile roofing systems similar to that required for this Project for a minimum of 5 years.
2. Installer shall maintain a full-time supervisor/foreman who is on jobsite during times that tile roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this Project.

1.4 MAINTENANCE

A. Deliver at the Project site 2 percent of total in each shape and color of tile used, boxed and identified, but not less than 10 of each.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide clay roof tiles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
B. Energy Performance, Energy Star: Provide roof tiles that are listed on the DOE's "Energy Star Roof Product List" for steep-slope roof products

2.2 CLAY ROOF TILES

A. Comply with ASTM C1167, molded- or extruded-clay roof tile units of shape and configuration indicated, kiln fired, and free of surface imperfections. Provide with fastening holes prepunched at factory before firing.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a. Boral Roofing LLC; Boral USA.
b. Claymex Brick and Tile, Inc.
c. D'Hanis Brick & Tile Company.
d. Gladding, McBean; PABCO Clay Products, LLC; PABCO Building Products, LLC.
e. Ludowici Roof Tiles.
f. MCA Clay Roof Tile.
g. Zion Tile Corp.

2. Durability: [Grade 1] [Grade 2] [Grade 3].
3. High-Profile Shape: Type I, [Spanish or "S"] [two-piece tapered mission] [two-piece straight mission] [two-piece straight barrel mission] [two-piece Greek] [two-piece Roman] <Insert shape>.

a. Accessory Tiles: [Ridge] [ridge vent] [ridge end] [hip and hip starter] [header course] [L-shaped rake edge] [roll rake edge] [starter] [end band] [terminal] [eave closure] [and] [top fixture] <Insert accessory> units.

4. Finish and Texture: [Matte, smooth] [Matte, striated] [Glazed, smooth] <Insert finish and texture>.
5. Color: [Terra cotta] [Brown] [Red] [Blended red] [Buff] <Insert description>.

2.3 UNDERLAYMENT MATERIALSelf-Adhering, Polymer-Modified Bitumen Sheet, High Temperature: ASTM D1970/D1970M, minimum [55-mil- (1.4-mm-)] [50-mil- (1.3-mm-)] [40-mil- (1.0-mm-)] <Insert thickness> thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied; and recommended in writing by manufacturer for use in tile roofing system required.[Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.]

1. Basis of Design: Grace Ice & Water Shield by GCP Applied Technologies.

B. Thermal Stability: Stable after testing at 240 deg F (116 deg C) in accordance with ASTM D1970/D1970M.
C. Top Surface: [Granule] [Textured polymer film] [Polyester].

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.
B. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

C. Elastomeric Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant of class and use classifications required to seal joints in clay-tile roofing and remain watertight; recommended in writing by manufacturer for applications indicated.

D. Roofing Asphalt: ASTM D312/D312M Type IV.

E. Mortar: ASTM C270, Type M, [natural color] [with ASTM C979/C979M, pigmented mortar matching the color of clay roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar].

F. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended in writing for application by clay-roof-tile manufacturer.

G. Eave Closure: Manufacturer's standard [EPDM] [copper] [stainless steel] [galvanized-steel] [aluminum, mill finish] <Insert material> eave closure formed to shape of clay roof tiles.

H. Wood Nailers: Comply with requirements for pressure-preservative-treated wood in Section 061000 "Rough Carpentry."

2.5 FASTENERS

A. Roofing Nails: ASTM F1667, [hot-dip galvanized-steel, 0.120-inch- (3.05-mm-)] [stainless steel, 0.120-inch- (3.05-mm-)] [copper, 0.135-inch- (3.43-mm-)] [silicon-bronze, 0.120-inch- (3.05-mm-)] diameter shank, sharp-pointed, conventional roofing nails with barbed shanks; minimum 3/8-inch- (10-mm-) diameter head; of sufficient length to penetrate 3/4 inch (19 mm) into substrate or extend at least 1/8 inch (3 mm) through thickness of the sheathing, whichever is less.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

B. Nails for Wood Nailers: ASTM F1667; common or box, steel wire, flat head, and smooth shank.

C. Wire Ties: [Copper] [Brass] [Stainless steel], 0.083-inch- (2.11-mm-) minimum diameter.

D. Tile Locks: [Brass] [Copper] [Stainless steel] [Hot-dip galvanized-steel], nominal 0.1-inch- (2.5-mm-) diameter wire device designed to secure butt edges of overlaid clay roof tiles.

E. Storm Clips: [Brass, minimum 0.048-by-1/2-inch (1.22-by-13-mm)] [Stainless steel, minimum 0.048-by-1/2-inch (1.22-by-13-mm)] [Hot-dip galvanized-steel, minimum 0.048-by-1/2-inch (1.22-by-13-mm)] <Insert requirements> strap-type, L-shaped retainer clips designed to secure side edges of clay roof tiles. Provide with two fastener holes in base flange.

2.6 METAL FLASHING AND TRIM

A. General: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
B. Sheet Metal: [Copper] [Stainless steel] [Zinc-tin alloy coated copper] [Anodized aluminum] [Aluminum, mill finished] <Insert requirements>.

C. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.

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.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through roofing.
3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.

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

C. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.2 UNDERLAYMENT

A. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.
3. Lap sides not less than 4 inches (102 mm).
4. Lap ends not less than 6 inches (152 mm), staggered 24 inches (610 mm) between succeeding courses.
5. Roll laps with roller.
6. Single-Layer Installation: Install over entire roof deck.
7. Cover underlayment within seven days.

B. Valley Underlayment: Install one layer of 36-inch- (914-mm-) wide underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.

1. Use [same underlayment as installed on field of roof] <Insert requirements>.
2. Lap ends at least 12 inches (305 mm) in direction that sheds water, and seal with asphalt roofing cement.
3. Fasten to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.

C. Extend the underlayment under all nailers and up side walls a minimum of 6 inches.

D. Repair tears in the underlayment with duct tape.

E. Openings through the tile for vents and similar projections shall be adequately weatherproofed and supported by additional blocking or roof framing as required.

3.3 SELF-ADHERING FLEXIBLE FLASHING

A. Install under hip and ridge tile, before installing tile, on clean, dry surfaces. Lap joints, where occurs, 2 inches. Do not stretch. Roll for complete adhesion.

3.4 INSTALLATION OF CLAY ROOF TILES

A. Install clay roof tiles in accordance with manufacturer's written instructions and recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Installation Manual" and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" unless more stringent requirements are specified in this Section or indicated on Drawings.

1. Install to resist wind forces resulting from design wind speeds indicated on Drawings.
2. Maintain uniform exposure and coursing of clay roof tiles throughout roof.
3. Extend tiles 2 inches (51 mm) over eave fasciae.

B. For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile are blended in factory and packaged accordingly so that tiles taken from one pallet show the same color range as those taken from other pallets, and match approved Samples. If not factory-blended, either return to manufacturer or blend tiles at Project site before installing.
C. Install tiles in straight and even rows, with vertical joints in alignment and horizontal joints parallel.
D. Match approved mockup.
E. Use adhesive on each tile, in accordance with its manufacturer’s instructions, and nail each tile securely in compliance with its manufacturer's instructions.
F. Fill voids and point with mortar colored to match existing mortar.

3.5 FIELD QUALITY CONTROL

A. The finished installation shall be watertight and free of damaged tile, mortar stains, and other unsatisfactory conditions that the Architect deems detrimental to its appearance and quality.
B. Repair unsatisfactory conditions as directed by the Architect.

END OF SECTION

SECTION 07 62 00 - FLASHINGS AND SHEET METALWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Gutters and downspouts.
2. Prefabricated counterflashing assemblies.
3. All other flashings and sheet metal items shown or required to make the building weathertight and not specified in other Sections.

B. Related requirements:

1. Section 01 40 00 for integrated exterior mockups.
2. Division 07 for roof hatch.
3. Division 08 for flashings in connection with skylights, and counterflashings at perimeter of skylights.
4. Division 23 for mechanical sheet metal work, and flashings and collars for mechanical and electrical work, except as specified herein for roof drains.

C. Definitions:

1. In general, flashings visible by the public shall be prefinished aluminum.
2. All other flashings shall be stainless steel.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to starting installation, arrange a pre-installation meeting between trades responsible for flashings and trades whose systems interface with flashings.
2. Attendees shall also include, but are not necessarily limited to the following:
    a. Contractor.
    b. Architect.
    c. Roofing material manufacturer’s technical representative.
    d. Representatives of waterproofing, fenestration, exterior building envelope, weatherproofing and exterior cladding systems.
3. Those present shall review the Drawings and Specifications, and typical flashing details.
4. Identify areas of concern and proposed remedial measures. Take photographs of the areas of concerns, before and after remedial measures are taken.
5. Record meeting minutes and distribute PDF copy to all concerned, including the Architect, within 48 hours of the meeting.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data, specifications, installation instructions and general recommendations for installation of prefabricated assemblies.
B. Shop Drawings:

1. Show typical and atypical details, including, but not limited to sheet metal components as well as all transitional and interface flashings between the various roofing, waterproofing and exterior building envelope weatherproofing assemblies, such as wall cladding and fenestration. Include material weight, methods of joining and attachment, and relationship with adjacent materials and supports of all sheet metal assemblies.
2. Detail interface with adjacent materials. For interface between flashings with different profiles and conditions difficult to illustrate in 2-dimension, furnish isometric drawings. Key sheet metal components, transitional and interface flashings, and associated materials to the Drawings, and show typical locations and profiles.
3. Submit plans indicating locations of expansion joints in gutters and other metal assemblies exceeding 50 feet in length.

C. Samples: Assembled Samples of the following at least 6 inches long, except as otherwise specified. Mount on plywood and include all components to be installed under this Section for each Sample.

1. Complete coping, including inside and outside corner condition, with legs at least 12 inches long; include typical moving and non-moving joints. Inside and outside corners must be fully soldered; sealant joints at those locations are unacceptable.
2. Gravel stop and/or roof termination.
3. Gutter including holding strap.
4. Counterflashing with receiver.

1.4 QUALITY ASSURANCE

A. Design criteria and performance requirements: Fabricate and install the work of this Section to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, excessive oil-canning, and fastener disengagement.

1. Thermal movements:

a. 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.
b. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
c. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
d. Temperature change (range) of 120-degree F ambient; 180-degree F, material surfaces.

2. Water infiltration: Provide sheet metalwork and flashings that do not allow water infiltration to building interior, and to damage materials, such as insulation, in exterior walls.

B. Mock-up: Provide flashing as required in the freestanding integrated exterior mockup.

1.5 HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheet steel: Commercial quality carbon steel sheets complying with ASTM A 653, lock-forming grade, galvanized with a G90 zinc coating, 24-gage (0.025 inch) minimum unless otherwise indicated, known commercially as "Satincoat", or "Galvanneal." Steel sheet thicknesses specified are base metal thicknesses prior to galvanizing.
B. Increase gage of galvanized sheet steel for larger sheet applications, such as gutters, curbs, etc.

C. Stainless steel: ASTM A 240, dead soft, fully annealed sheets, AISI No. 2D matte non-reflective finish, or 2B bright, moderately reflective finish, 0.028-inch thick for concealed application, unless noted otherwise.
D.

E. Aluminum:

1. Sheet aluminum: ASTM B 209. (0 .032 inch thick.)
2. Aluminum extrusions: ASTM B 229.

F. Nails:

1. For attaching sheet steel to wood: Large flat head "stronghold" type roofing nails with barbed point, formed of hot-dip galvanized steel of sufficient length to penetrate a minimum of one-inch into the wood nailer.
2. For attaching sheet steel to concrete: 1-1/4-inch by 8d hot-dip galvanized hardened steel nails with lead washers.

G. Hot dip galvanized self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Fasteners for flashing and trim: Blind fasteners or self-drilling screws, gasketed with hex washer head.
2. Blind fasteners: High-strength aluminum or stainless-steel rivets.

H. Solder and flux:

1. Galvanized sheet metal: 50-50 lead/tin solder complying with ASTM B 32, used with a non-corrosive flux.
2. Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
3. Stainless steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.

I. Sealing tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing.

1. Provide permanently elastic, nonsag, non-toxic, non-staining tape.
2. Tremco 440, Schnee-Morehead, Inc. SM5700, or equal.

J. Expansion-joint sealant: For hooked-type expansion joints, which must be free to move, provide non-setting, non-hardening, non-migrating, heavy-bodied polyisobutylene (butyl) sealant.

K. Bituminous coating:

1. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.
2. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

L. Slip sheet: Red Rosin Building paper, minimum 12 lb./100 square feet by W.R. Meadows or equal.

1. Size: 36 inches by 150 feet.

2.2 FLEXIBLE FLASHING

A. Flexible flashing materials installed under, or interface with sheet metal. Protect flexible flashing materials from UV exposure; do not leave uncovered in excess of the material manufacturer’s published exposure limits.

B. Self-adhering waterproofing membrane materials shall be either manufactured by the Air and Water Barrier material manufacturer as part of their system or approved for use as being compatible with the Air and Water Barrier system specified in Section 07 27 26.

1. General: For use in high temperature environments (temperatures in excess of 225 degrees F.), provide flashing rated by the flexible flashing manufacturer as “high temperature resistant” and suitable for its intended use and application.
2. For use on exterior walls, where neither metal flashing, air and water barrier, or high-temperature flashings occur:
    a. Perm-A-Barrier by GCP Applied Technologies.
    b. Window and Door Flashing by Carlisle Coatings & Waterproofing.
    c. Fast Flash by Protecto Wrap Co.
    d. Sealtight Air-Shield by WR Meadows, Inc.
    e. Seam Seal Tape by SafSeal Innovations.
    f. TW Moisture Wrap by Tamko Waterproofing.

3. For use under copings and other sheet metal assemblies: Self-adhering (peel and stick) flexible high-temperature resistant, self-adhering waterproofing flashings by one of the following, and shall include primers, sealants and mastics, liquid membrane and accessories required for complete systems.

a. Perm-A-Barrier Wall Flashing by GCP Applied Technologies.
b. WIP 300HT-by Carlisle Coatings & Waterproofing.
c. PW 100/40 HT by Protecto Wrap Co.

2.3 PREFABRICATED ASSEMBLIES

A. Counterflashing assemblies: Formed of 24-gage galvanized sheet steel, of the profiles shown on the Drawings, complete with factory-formed internal and external corners, and end closures by one of the following.

1. Basis of design is for Fry Reglet Corp. Type ST (stucco), CO (concrete), SM (surface mounted).]
2. Keystone Flashing Co.
3. CF Cheney Flashing Co.
4. MM Systems Corp.

2.4 FABRICATION

A. General:

1. Shop fabricate flashings and sheet metal work to comply with profiles and sizes indicated on the Drawings and standard Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) detail plates of the "Architectural Sheet Metal Manual" as follows, unless otherwise indicated.
   a. Gravel stops and roof edging: Figure 2-5C.
   b. Laps: J2.
   c. Copings: Figure 3-4A. Miter and solder inside and outside corners continuously to make watertight; the use of sealant for that purpose is unacceptable.
2. Form sheet metal on bending brake with straight, sharp edges. Shape, trim, and hand seam sheet metal on bench; keep job site forming to a minimum.
3. Comply with metal producers' recommendations for tinning, soldering, and cleaning flux from metal.
4. Fabricate with joints and corners accurately machined, filed and fitted, and rigidly framed together and connected.

B. Galvanized Sheet Metal flashing: See Section 09 90 00.
C. Fabricate in as long length as possible to minimize field joints.
D. Prefabricate intersections, including counterflashings, with mitered, riveted joints. Make corners and intersections with legs a minimum of 24-inch long extending in each direction.
E. Tinning and soldering:

1. Tin edges on both sides of sheet steel to be soldered.
2. Perform soldering slowly, thoroughly heating seams and completely sweating solder through full width of seams.

F. Exposed edges: Neatly double back sheet metal 1/2-inch to stiffen edges and to provide a finished appearance.
G. Provisions for attachment to structure: Furnish supports, hangers, bracing, anchors and other devices shown, specified or necessary for reinforcement and proper attachment of flashings and sheet metal to building.

2.5 FINISHES

A. Galvanized Sheet Metal flashing: See Section 09 90 00.
B. Exposed aluminum-fabricated copings and running flashing: Two-Coat Fluoropolymer: AAMA 2605. 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.

1. Custom color and Gloss as selected by Architect. Finish to be non-reflective.

C. Stainless steel: Dull, unless indicated on drawings to be MTL-2. See Finish schedule on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 GENERAL REQUIREMENTS

A. In addition to the assemblies listed above, provide required sheet metal flashings, counterflashings, transitional and interface flashings required to achieve a properly weatherproofed, flashed and counterflashed building envelope, including sheet metal flashings in the angles formed where exterior waterproofed decks abut walls, and as well at curbs, platforms, ventilators, pipes, roof hatches, and other vertical and horizontal surfaces, where indicated and necessary to make the Work weatherproof.
B. Comply with manufacturer’s installation instructions where applicable, and applicable SMACNA and NRCA details, except as indicated and specified.
C. Install counterflashing assemblies at a constant height above the roof.

1. Anchor counterflashing securely into reglet by friction or provide lead wedges spaced 2-foot o.c. maximum.
2. Use manufacturer standard splice plates and preformed corners for a weathertight assembly.

D. Coordinate this work with other trades whose work penetrates, intersects and adjoins flashings and sheet metal work, to permit the correct sequencing and the watertightness of the assemblies.
E. Isolate aluminum from cementitious materials and dissimilar metals.

3.3 INSTALLATION

A. General:

1. Install sheet metal work in accordance with the approved Shop Drawings.
2. Fasten coping on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Except as specified, lap and solder corners

and angles; lapping and sealant method is not an acceptable substitute for coping corners; provide for thermal movement no more than 10 feet from corner.

3. Slope copings and sills with a minimum slope of 10 percent to drain away form walls and building interior. Slope gutters 1/4-inch per foot to drain.
4. Solder joints of window flashings (pans) and saddles.
5. Attach work securely to supporting construction, plumb, level, with tight, flush joints allowing for thermal movements.
6. Install work with lines, arises, and angles sharp and true.
7. Fold exposed edges neatly to form a 1/2-inch hem on the concealed side; hem all exposed edges, unless otherwise indicated.
8. Assemble work so that face of metal in contact has hairline joints, except where required for expansion or fitting. Provide back-up plates at joints.
9. Conceal fastenings and reinforcement where they would be visible by the public and the building occupants.
10. Finish work shall be straight, smooth and continuous, without dimples, dents and other damage.

B. Soldering:

1. Protect underlying waterproof membrane (flexible flashing) when soldering sheet metal.
2. Except as specified, solder all joints not intended for expansion and contraction.
3. Clean material and tin prior to soldering.
4. Solder slowly. Heat the seams thoroughly, and completely fill with solder.
5. Make exposed soldering on finish surfaces neatly, full flowing and smooth.
6. Wash acid flux with a soda solution after soldering and remove soldering flux on exposed surfaces.

C. Nailing:

1. Confine nailing of sheet metal generally to sheet metal having a maximum width of 18-inches. Nailing of flashings shall be confined to one edge only.
2. Space nails evenly not over 12-inches o.c., and approximately 2-inches from the edge.
3. Face nailing is not permitted. Do not nail sheet metal assemblies on horizontal surfaces.
4. Where sheet metal is applied to surfaces other than wood, furnish detailed Shop Drawings showing locations of required sleepers and nailing strips specified in Section 06 10 53 (06 10 00).

D. Cleats:

1. Provide cleats for sheet metal 18-inch and over in width. Space cleats evenly not over 12-inches o.c.
2. Make cleats not less than 2-inch wide by 3-inch long, and of the same material and thickness as the sheet metal being installed.
3. Secure one end of the cleat with 2 nails and the cleat folded back over the nail heads. Lock the other end into the seam. Pre-tin cleats for soldered seams.

E. Bolts, rivets, and screws:

1. Install bolts, rivets, and screws where required. Space equally and symmetrically.
2.
3. Provide compatible washers to protect surface of sheet metal and to provide a watertight connection.

F. Dissimilar material protection:

1. Protect sheet metal in contact with dissimilar metals, concrete, masonry and plaster with a heavy coating of bituminous paint, approved separation tape, or building felt or paper.
2. Set sheet metal assemblies supported by pressure-treated wood on building paper or felt attached to the wood nailer, except set copings on flexible flashing specified. Lap on vertical surfaces at least 2 inches.

G. Seams - general: Make seams straight, uniform in width and height, with no solder showing on the face.

1. Flat-lock seams: Finish not less than 3/4-inch wide made in the direction of water flow.
2. Lap seams: Finish soldered seams not less than one-inch wide. Overlap seams not soldered at least 3-inches.
3. Loose-lock expansion seams: No less than 3 inches wide, designed to provide minimum one-inch movement within the joint. Fill joint completely with sealant applied at not less than 1/8-inch thick bed.
4. Standing seams: Not less than one-inch high, double locked without solder.

H. Expansion and contraction:

1. Provide for thermal and building movement without over-stressing the material, breaking connections or producing wrinkles and distortion in finished surfaces. Make sheet metal installations weathertight at all locations.
2. Provide expansion and contraction joints at not more than 40-foot intervals, except that where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing, provide an additional joint. Where expansion and contraction joints are exposed to view, their location is subject to the Architect's approval.
3. Exposed surfaces shall be free from visible wave, warp, and buckle.

I. Flexible flashing: Install under all parapet caps. Lap joints 2-inches. Carry flexible flashing down wall as far as the edge of the coping; overlap wall weather barrier at least 2-inches.
J. Install curbs and gravity roof vents level and square with tight, waterproof joints; attach securely to deck.
K. Completed flashings and sheet metal work shall be watertight, free of tool marks, dents, scratches and other damages, with joints and corners accurately machined, filed and fitted, and rigidly framed together and connected. Non-complying work shall either be repaired, when repairs are acceptable to the Architect, or replaced with new, undamaged flashings and sheet metal work.

END OF SECTION

SECTION 07 84 00 – PENETRATION JOINTS & PERIMETER FIRE BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: firestop systems consisting of a material, or combination of materials installed to maintain the integrity of the fire-resistance rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations, blank openings, construction joints, or at the gap created at the building perimeter of the horizontal fire resistance rated assembly and non-fire-resistance rated exterior wall and in or adjacent to either fire-resistance or non-fire-resistance rated barriers in accordance with Authorities Having Jurisdiction (AHJ) requirements. Use firestop systems at locations including, but not limited to, the following:

1. Protected openings including both empty openings and openings that contain penetrations.
2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.
4. Joints in fire-resistance-rated assemblies that to allow independent movement.
5. Perimeter of the horizontal fire-resistance rated assembly and exterior wall between a rated floor/roof and an exterior wall assembly that is not fire-resistance rated.
6. Joints, through penetrations and membrane penetrations in Smoke Barriers, Smoke Partitions and those assemblies required to limit, restrict or retard the passage of smoke.

B. Related requirements: Divisions 07 and 09 for all other sealants.

1.2 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement governs.

1. American Society for Testing and Materials (ASTM).

   a. E 84 Test Method for Surface Burning Characteristics of Building Materials
   b. E 119 Test Method for Fire Tests of Building Construction and Materials
   c. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F
   d. E 814 Fire Tests of Through-Penetration Fire Stops
   e. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths
   f. E 1966 Test Method for Resistance of Building Joint
   g. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops
   h. E 2393 Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems
   i. E 2307 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)
   j. E 2837 Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.

2. Factory Mutual (FM) Approvals:

   a. FM Approval Standard of Firestop Contractors – Class 4991
   b. FM Firestop Exam
   c. FM Approvals Standard for Firestops – Class 4990

3. Firestop Contractors International Association (FCIA):

    a. MOP – FCIA Firestop Manual of Practice
    b. FCIA Recommended Professional Practice RPP-L-2018-1, for the Identification of Fire-Resistance Rated and Smoke Resistant Penetration and Joint Firestopping
    c. International Accreditation Services: iAS Accreditation Criteria for Special Inspection Agencies AC-291.

4. International Firestop Council (IFC):

    a. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments
    b. Ref. 2 Inspectors Field Pocket Guide
    c. Ref. 3 IFC Recommended Guidelines for Performing Destructive Testing for Installed Penetration Firestop Systems, Fire Resistive Joint Systems, or Perimeter Fire Barrier Systems.

5. National Fire Protection Association (NFPA):

    a. NFPA 1 – The Fire Code
    b. NFPA 70 - National Electric Code
    c. NFPA 101 - Life Safety Code
    d. NFPA 221 - Fire Walls and Fire Barriers (preliminary to be released)
    e. NFPA 251 - Fire Tests of Building Construction and Materials

6. Underwriters Laboratories, Inc. (UL):

    a. UL Qualified Firestop Contractor Program
    b. UL Firestop Exam
    c. UL 263 Fire Tests of Building Construction and Materials
    d. UL 723 Surface Burning Characteristics of Building Materials
    e. UL 1479 Fire-Tests of Through-Penetration Fire Stops
    f. UL 2079 Tests for Fire Resistance of Building Joint Systems

1.3 SUBMITTALS

A. Data: Manufacturer Product Data and installation instructions for materials and prefabricated devices.
B. Shop Drawings: Large scale Drawings indicating materials, installation methods, and interfaces with adjoining construction for each penetration firestop system.

    1. Include qualified testing and inspecting agency’s penetration firestop design designation evidencing compliance with requirements for each condition indicated.
    2. Include qualified testing and inspecting agency’s applicable illustrations showing each penetration firestop configuration at every construction assembly penetrated for each type of penetrating item.
    3. Where Project conditions require modification of qualified testing and inspecting agency's tested assembly to suit a particular penetration firestop condition, obtain acceptance of AHJ for the modification prior to submitting Shop Drawings.

C. Test reports: Certified laboratory test report demonstrating the material or combination of materials proposed for use meets the requirements specified in ASTM E 814, are so classified in UL Building Materials Directory and are approved by the AHJ.
D. Certificates: Product certificates signed by firestopping product manufacturers certifying their products comply with specified requirements.
E. Documentation

1. Provide details of installations, with Listed Systems and/or EJ/EFRRA's and locations on Life Safety Drawings for restoring the fire resistance rating or smoke resistant properties where a breach in an assembly occurs for a fire-resistance rated joint, penetration and/or safing slot, perimeter interior fire containment system.
2. Deliver such documentation as a binder, electronic or software application/program to the Architect at the end of construction.
3. Make this information part of the closeout documents.

1.4 QUALITY ASSURANCE

A. Uniformity: Obtain firestopping materials and components from a single manufacturer for each kind of penetration and construction condition indicated. Do not mix manufacturer's materials in the same assembly
B. Compatibility: Provide firestop systems compatible with one another, and with the assemblies into which they are installed.
C. Regulatory requirements: Materials proposed for use shall be approved by the AHJ for their intended use.
D. Installer's qualifications:

1. FM-approved in accordance with FM 4991 – Standard for the Approval of Firestop Contractors, or.
2. UL Qualified Firestop Contractor, and,
3. Firestop Contractors International Association Contractor Member in good standing.
4. Licensed by AHJ, where applicable.
5. Shown to have successfully completed not less than 5 comparable scale projects

E. Special Inspectors credentials: Special Inspectors with experience in the same type and complexity of work inspected. In addition, both with the competence and experience shall be acceptable to the AHJ.
F. Repairs: Provide a narrative that lists materials to be used and clearly explains repairs procedures to maintain the safing capabilities of the assemblies.

PART 2 - PRODUCTS

2.1 HANDLING

A. Store materials to prevent deterioration or damage.

2.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Penetrations: Provide firestop products that when installed to the tested and listed system or engineering judgment (EJ)/equivalent fire-resistance rated assembly (EFRRA) to become firestop systems or EJ/EFRRA's produced to resist the spread of fire, and/or the passage of smoke through breaches, gaps, openings, in fire-resistance-rated and smoke-resistant assemblies according to requirements indicated, including but not limited to the following.

1. Firestop all breaches made in fire-resistance rated assemblies for penetrating items passing through fire-resistance-rated wall and floor assemblies and other locations as indicated on the Drawings.
2. Provide complete penetration firestopping systems tested and approved by a nationally recognized third-party testing agency to the listing and the manufacturers installation instructions.
3. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined through testing in accordance with ASTM E 814 or UL 1479, but not less than one hour or the no less than the fire-resistance rating of the construction assembly being penetrated by the penetrating item.

4. T - Rated Through-Penetration Firestop Systems: Provide firestop systems with T (temperature) ratings, in addition to F ratings, as determined per ASTM E 814 or UL 1479, where indicated and required by the applicable Building Code. T-rated assemblies are required where the following conditions exist.

    a. Where firestop systems protect floor penetrations located outside of wall cavities.
    b. Where firestop systems protect floor penetrations located outside fire-resistive shaft enclosures.
    c. Where firestop systems protect penetrations located in fire-resistive construction that have doors required to have a temperature-rise rating.
    d. Where firestop systems protect penetrating items larger than a 4-inch diameter nominal pipe or 16 square inches in overall cross-sectional area.

5. L – Rated Through-Penetration Firestop Systems: Provide firestop systems with Air Leakage (L) ratings, in addition to F and T ratings, as determined in accordance with UL 1479, where indicated.
6. Fire-resistive joint sealants: Provide joint sealants with a fire-resistance rating, determined in compliance with ASTM E 119, equaling or exceeding the fire-resistance rating of the construction penetrated but not less than one hour.

B. For firestopping exposed to view, traffic, moisture, or physical damage: Provide products that will not deteriorate when exposed to these conditions.

1. For plumbing and wet-pipe sprinkler system piping penetrations provide moisture-resistant penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches or more in any dimension, and for penetrations exposed to possible loading and traffic: Provide penetration firestop system capable of supporting the floor load involved without damage to the firestop system.
3. For penetrations with insulated piping: Provide penetration firestop systems not requiring removal of piping insulation.

C. For firestop exposed to view: Provide products with a flame-spread rating of than 25 or less and a smoke-developed value of 450 or less, as determined in compliance with ASTM E 84.

2.3 MANUFACTURERS

A. Provide materials from one or a combination of the following, as selected by the installer, depending on the condition of use:

1. 3M Fire Protection Products.
2. Graber Construction Products.
3. Hilti Construction Chemicals, Inc.
4. STI Firestop.
5. Specified Technologies, Inc.
6. Tremco Inc.
7. Emseal Joint Systems Ltd.
8. Rectorseal/CSW Industrials

2.4 MATERIALS

A. Ceramic-fiber and mastic coating: Ceramic fibers in bulk form formulated for use with mastic coating, and ceramic fiber manufacturer's mastic coating.
B. Ceramic-fiber sealant: Single-component formulation of ceramic fibers and inorganic binders.
C. Endothermic, latex compound sealant: Single-component, endothermic, latex formulation.
D. Intumescent, latex sealant: Single-component, intumescent, latex formulation.

E. Intumescent putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
F. Intumescent wrap strips: Single-component, elastomeric sheet with aluminum foil on one side.
G. Job-mixed vinyl compound: Prepackaged vinyl-based powder product for mixing with water at the Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
H. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at the Project site to form a non-shrinking, homogenous mortar.
I. Pillows/bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
J. Silicone foam: 2-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.
K. Silicone sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant.
L. Solvent-release-curing intumescent sealant: Solvent release curing, single-component, synthetic polymer based sealant.
M. Color: Where firestopping/firesafing material is exposed to view, provide material color selected by the Architect from the manufacturer's palette, unless the material will be field painted.

2.5 ACCESSORIES

A. Provide accessories as required to install fill materials and complying with the system description above.

1. General: As specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistive assembly.
2. Permanent forming/damming/backing materials:

a. Semi-refractory fiber (mineral wool) insulation.
b. Ceramic fiber.
c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
d. Fire-rated form board.
e. Joint fillers for joint sealants.

3. Temporary forming materials:

a. Substrate primers.
b. Collars.
c. Steel sleeves.

2.6 MIXING

A. For products that require field mixing prior to application, comply with firestopping manufacturer's directions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which penetration firestop systems will be installed.
B. Verify that surfaces to be in contact with firestopping materials are clean of dirt, grease, oil, loose materials, rust, and other substances that may affect proper fitting or the required fire resistance.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. General: Install materials in conformance with their manufacturer's instructions and to comply with UL Fire Resistance Directory.
B. Surface cleaning: Clean openings and joints immediately prior to installing firestopping in accordance with the recommendations of firestopping manufacturer and the following:

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

C. Priming: Prime substrates where recommended by the firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
D. Masking tape:

1. Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials.
2. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.3 PENETRATION FIRESTOP SYSTEMS

A. Forming/damming materials and accessories:

1. Install as required to support fill materials during their application to produce the cross-sectional shapes and depths required to achieve fire ratings of firestop systems.
2. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

B. Install fill materials for penetration firestop systems to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
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.

3.4 FIRE-RESISTIVE JOINT SEALANTS

A. Install joint fillers to provide support of sealants during application, produce the cross sectional shapes and depths of installed sealants for optimum sealant movement capability, and develop fire-resistance rating required.
B. Install sealants so they will directly contact and fully wet joint substrates. Completely fill recesses provided for each joint configuration, and provide uniform, cross- sectional shapes and depths relative to joint width. Install sealants at the same time joint fillers are installed.
C. Tool non-sag sealants immediately after sealant application and before skinning or curing begins; form smooth, uniform beads. Eliminate air pockets to ensure contact and adhesion of sealants with sides of joint.

1. Remove excess sealant from surfaces adjacent to joint.
2. Do not use tooling agents that will discolor sealants or adjacent surfaces, or that are not approved by the sealant manufacturer.

3.5 FIELD QUALITY CONTROL

A. Examine penetration firestop systems to ensure proper installation prior to concealing or enclosing firesafed and firestopped areas.
B. Repair damaged areas and restore the integrity of the assembly.
C. Keep areas of work accessible until inspection and approval by applicable authorities having jurisdiction.

3.6 CLEANING

A. Cleanup spills of liquid components.
B. Cut and trim excess materials neatly, flush with adjacent surfaces.

3.7 ON SITE FIRESTOP IDENTIFICATION SYSTEMS:

A. Wall and floor identification system, shall be permanent, affixed, labels made that self-destruct upon removal, consisting of paper, metal or ceramic fiber materials, or hanging tags in accordance with CBC 703.7 and FCIA Recommended Professional Practice RPP-L-2018-1, for the Identification of Fire-Resistance Rated and Smoke Resistant Penetration and Joint Firestopping. The firestop system identification device shall be located within 6” of the firestop system edge, each side of the wall, accessible side of horizontal assemblies, in or out of view. Firestop identification systems shall be installed as each firestop system is completed. Firestop Identification system shall have the following minimum information:

1. The words – “Warning - Firestop System – Do Not Remove or Tamper”
2. UL or other laboratory tested and listed system number.
3. Date of Installation.
4. Installing subcontractor Company name, contact information.
5. Manufacturer Company Name
6. Installing Individual Identifier
7. Fire Resistance Rated Assembly Markings
8. Provide identification for all vertical fire resistance rated and smoke resistant assemblies.

    a. Identification markings: Adhesive tamper evident stickers, stencil painted with lettering at least 3 inches high with a minimum 3/8-inch stroke in contrasting color.
    b. Marking to incorporate the assembly’s fire-resistance rating and the type of assembly that the wall is. Examples below are from the IBC and NFPA:

        1) Fire Barrier – DO NOT BREACH - PROTECT ALL OPENINGS.
        2) Smoke Barrier – DO NOT BREACH - PROTECT ALL OPENINGS.
        3) Fire Wall – DO NOT BREACH - PROTECT ALL OPENINGS.
        4) Fire Partition – DO NOT BREACH - PROTECT ALL OPENINGS.
        5) Smoke Partition – DO NOT BREACH - PROTECT ALL OPENINGS.

END OF SECTION

SECTION 07 92 00 - JOINT SEALERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements pertaining to all sealants required for the Project (except as specified below and becomes an integral part of all Sections containing references to this Section, as well as all locations where sealants are indicated on the Drawings and required to make the building weathertight.

B. Section also includes sealants for interior joints in vertical applications, where required to close gap between different materials (paintable and non-paintable), and horizontal traffic surfaces as follows:

1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings.
3. Tile control and expansion joints.
4. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
5. Perimeter joints of toilet fixtures.
6. Other joints indicated.

C. In addition, the work of this Section also includes air sealing to supplement and provide continuity of main and primary air barrier assemblies, including sealing and/or filling perimeter of door and window openings, crevices, gaps, cracks in walls, roof/wall connections, mechanical and electrical penetrations in walls, floors, roofs, exterior glazed assemblies mullions, beams, columns enclosures and similar locations with foam to provide air barrier integrity and a permanent barrier against air infiltration and loss.

D. Related requirements:

1. Division 07 for firestopping sealants.
2. Division 08 for storefronts and glazing sealants.
3. Division 09 for acoustical sealants.
4. Division 23 for duct sealants.

1.2 DEFINITIONS

A. Substrates:

1. M type substrates: Concrete, concrete masonry units, brick, mortar, natural stone. The term "masonry" means brick, stone, and concrete masonry work.
2. G type substrates: Glass and transparent plastic glazing sheets.
3. A type substrates: Metals, porcelain, glazed tile, and smooth plastics.
4. O type substrates: Wood, unglazed tile; substrates not included under other categories.

1.3 SUBMITTALS

A. Data:

1. Manufacturer Product Data and published instructions for each type of sealant, backing, bond breaker, and other accessory materials, together with statement that the proposed materials comply with these Specifications.
2. Include manufacturers' recommendations for surface preparation and priming for all substrates to be in contact with sealant on the Project.

B. Certification: Sealant manufacturer certification that sealants, backing rods, and other materials proposed for use in the application of sealants, are chemically compatible with the materials which will come in contact with the sealants and will not cause deterioration, premature aging and staining of adjacent materials, or the sealants.

C. Test results: Results of adhesion and staining tests performed on same materials as those intended for use on the Project.

D. Samples: Cured Samples of the various types and colors of materials proposed for use, approximately 12 inches long, mounted on hardboard backing.

1.4 QUALITY ASSURANCE

A. Uniformity: All sealants used in or on the exterior walls of the building(s) shall be made by the same manufacturer.

B. Installer qualifications: Firm with a minimum 5 years of experience with joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

C. Color selection:

1. Final color selection of sealants to be used for exterior locations will be made by the Architect from job-applied Samples on in-place materials.
2. The Architect will select locations and extent of these Samples, but their lengths will not exceed 10 feet for vertical and horizontal joints of each sealant color.

D. Quality control by sealant manufacturer:

1. Submit statements on the manufacturer's letterhead, dated no earlier than one year prior to submittal, for tests listed below.
2. Test data more than a year old will be acceptable provided manufacturer states that formulations or manufacturing methods have not changed sufficiently to change test results.
3. Submit Samples of materials to be used for the Project to the manufacturer as required for tests.
4. Test methods: The following ASTM standards methods apply to sealants to be provided for the Project.
    a. C 794: Sealant compatibility and adhesion to each substrate to be encountered on the Project.
    b. Compliance with C 920 for elastomeric sealants. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (ASTM C 719), low temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
    c. C 1087: Sealant compatibility with backing.
    d. C 1087: Sealant compatibility and lack of adhesion to bond breaker.

e. C 1184: Structural Glazing Specifications.
f. C 1193: Guide for Use of Sealants.
g. C 1248: Stain Test Method.
h. C 1401: Guide for Structural Glazing.
i. C 1472: Guide for Calculating Joint Movement.

5. Include identification of any special substrate cleaning process and required adhesion promoter or primer.

1.5 HANDLING

A. Store sealant containers in a protected location in compliance with their manufacturer's instructions until their use. Do not store at temperature higher than 80-degree F.

1.6 JOB CONDITIONS

A. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's recommended limits.
B. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure and development of early bond strength.

1.7 WARRANTY

A. Warrant sealants against defective materials and workmanship for the following length of time after Substantial completion:

1. Manufacturer:

a. Exterior vertical sealant: Manufacturer’s 20-year weatherseal warranty, including non-staining warranty for Dowsil 795 and 756 SMS.
b. All other exterior locations: Manufacturer’s 5 years weatherseal warranty.

2. Installer: 5 years labor and material warranty.

B. Warranty shall further state that installed sealants are warranted against the following:

1. Water leakage through exterior sealed joints.
2. Adhesive or cohesive failure of sealant.
3. Staining of adjacent surfaces caused by migration of sealants or primer.
4. Chalking or visible color change of the cured sealants.

C. Make repairs during the 5-year warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior joint sealants are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, with recognized limitations of wear and aging as indicated for each application.

2.2 MANUFACTURER/TYPE - SEALANTS

A. Colors: Match sealant color to color of adjacent materials as closely as possible using colors selected from the manufacturer's standard palette, as approved by the Architect.

B. General:

1. Do not mix multiple component materials until required for use.
2. Use materials “as received” from manufacturer, without additions, deletions and adulterations of materials.
3. Do not use sealants that have started to cure and those whose shelf life expired.

C. Compatibility: Provide joint sealers, joint fillers and other related materials as follows:

1. That will not cause staining, degradation and premature aging of the adjacent surfaces and the sealant itself, when in contact with these surfaces.
2. 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.

D. Bulk sealants:

1. For interior and exterior horizontal application subject to pedestrian or vehicular traffic: Single component silicone sealant.
    a. Type and grade: S (single component) SL (self-leveling).
    b. Class: 25.
    c. Use related to exposure: T (traffic).
    d. Uses related to joint substrates: M, A, and, as applicable to joint substrates indicated, O.
    e. Products:
        1) Dowsil; “888”” or “SL Parking Structure Sealant” (basis of design).
        2) Pecora Corp.; “300 SL Pavement Sealant.”
        3) Crafco Inc.; “RoadSaver Silicone SL.”
2. For all other exterior applications, except where stone occurs:
    a. Type and grade: S (single component) and NS (nonsag), neutral- and basic-curing silicone sealant.
    b. Class: 100/50.
    c. Use related to exposure: NT (non-traffic).
    d. Uses related to joint substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    e. Products:
        1) Dowsil “795” (basis of design).
        2) General Electric “Silpruf,” “Silpruf LM,” “Silpruf NB.”
        3) Tremco “Spectrem 1.”
3. For stone joints where sealant will contact stonework (interior and exterior):
    a. Type and grade: S (single component) and NS (nonsag), neutral- and basic-curing silicone sealant.
    b. Class: 100/50.
    c. Use related to exposure: NT (non-traffic).

d. Uses related to joint substrates: M, G, A, and, as applicable to joint substrates indicated, O.
e. Products:

1) Dowsil “756 SMS,” (basis of design).

a) Dowsil “795” may be used if tested on stone prior to final installation and no staining is observed.

2) General Electric “GE SC S9000 SMS.”
3) Tremco “Spectrem 3.”
4) Pecora “895 NST.”

4. For interior damp, wet and semi-wet locations, other than floors, such as toilet rooms where a mildew-resistant sealant is required: Provide white sealant, unless otherwise noted. Single-component mildew-resistant neutral-curing silicone sealant:

a. Type and Grade: S (single component) and NS (nonsag).
b. Class: 25.
c. Use related to exposure: NT (non-traffic).
d. Uses related to joint substrates: M, G, A, and, as applicable to joint substrates indicated, O.
e. Products:

1) Dowsil. “786” basis of design.
2) Pecora Corp. “898.”
3) General Electric Corp. “1700.”

5. For all other interior applications (paintable sealant): Latex sealant complying with ASTM C 834, Type P, Grade NF.

a. Pecora Corp. “AC-20+.”
b. Schnee-Morehead, Inc. “SM 8200.”
c. Sonneborn, Division of ChemRex Inc. “Sonolac.”
d. Tremco “Tremflex 834” or “Acrylic Latex 384.”

6. Acoustical sealant: See Section09 80 00.

E. Tape sealants: American Saint-Gobain “Norseal 730” or “Norseal 770,” or equal by Pres-On Tape & Gasket Corp. or Schnee-Morehead.

2.3 ACCESSORY MATERIALS

A. Sprayed polyurethane foam sealant: One- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 pcf density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
B. Joint cleaner, primer and sealer: As recommended by the sealant manufacturer, for the surfaces to be cleaned, primed or sealed.
C. Bond breaker tape:

1. Polyethylene or other plastic tape recommended by the sealant manufacturer to prevent 3-sided adhesion where backer rod cannot be used, except for non-moving joints.
2. Use self-adhering tape wherever possible.

D. Backer rod:

1. General: Provide size, density and shape of rod which will control the joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
2. Type: ASTM C 1330, of type indicated below:
    a. Type C: Closed-cell material with a surface skin, Nomaco “SOF ROD/Dual Rod,” or equal.
    b. Type O: Open-cell material for use only for the inner seal of double sealed joints, Nomaco Foam-Pak II, or equal.
    c. For sealant in vehicular traffic areas, provide solvent-resistant backer rods, Nomaco HBR/Green Rod, or equal.
    d. For fillet and cove joints, Nomaco “HBR” 1/4-inch Round.”
3. Elastomeric tubing sealant backings:
    a. Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26-degree F.
    b. Provide products with low compression set.
4. In paving subject to traffic: Provide hard joint filler such as cork; prevent 3-sided adhesion by using bond breaker tape.

E. Masking tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 JOINT PREPARATION

A. Clean-out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following.
B. Remove foreign material from joint substrates that could interfere with adhesion of sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), oil, grease, waterproofing, water-repellents, water, surface dirt, and frost.
C. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar 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.
    1. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

D. Remove laitance and form release agents from concrete.
E. Clean metal, glass, glazed surfaces of ceramic tile, and other non-porous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
F. Do not proceed with sealant installation over surfaces that have been painted, waterproofed or treated with water-repellent or other coating unless specifically approved in writing by the sealant manufacturer.
G. Use masking tape or other protection to limit coverage of sealant to joints to be sealed. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. Comply with sealant manufacturer's instructions and ASTM C 1193, except where more stringent requirements are specified herein. At the Architect's option, ASTM C 1193 may also be used for rejection of unacceptable installations.
B. Prime or seal surfaces when recommended by the sealant manufacturer; when the manufacturer's instructions on priming are optional, prime the surface. Do not allow primer/sealer to spill or migrate onto adjacent surfaces.
C. Install backer rod for all sealants, except (1) for exterior sealants subject to traffic (verify that joint filler in paving is installed at the proper depth), (2) where the size of joint prevents the insertion of a backer rod, and (3) where recommended otherwise by the sealant manufacturer.

    1. Install backer rods with blunt or rounded tools to avoid puncturing the material.
    2. Do not twist, stretch or braid the backer rod.

D. Install bond breaker tape where space limitation does not permit use of a backer rod.
E. In no case shall sealant have 3-sided adhesion, except for non-moving joints.
F. Employ only proven installation techniques that will ensure that sealants are installed in uniform, continuous ribbons without gaps or air pockets and with complete "wetting" of the rabbet surfaces equally on opposite sides.

    1. Fill concave joints to the configuration shown on Figure 8A of ASTM C 1193.
    2. Provide flush joints to the configuration shown on Figure 8B of ASTM C 1193.
    3. Provide recessed joints configuration as shown on Figure 8C of ASTM C 1193, unless otherwise indicated or required to match adjacent non-moving joint.
    4. Where horizontal joints occur between horizontal and vertical surfaces, fill joints to form a slight cove to prevent trapping moisture and dirt.
    5. Immediately after sealant application and prior to beginning of skinning or curing, tool sealant using tooling agents that will not discolor sealants or adjacent surfaces and are approved by sealant manufacturer.

G. Do not allow sealant or other compound to overflow, spill or migrate into voids of adjacent construction.
H. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces.

3.4 CURING/PROTECTING

A. Cure sealants in compliance with their manufacturer's instructions to obtain high early bond strength, internal cohesive strength and durability.
B. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 07 92 19 - ACOUSTIC SEALANTS AND INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: The requirements below apply to all rooms and spaces where partitions are indicated to be filled with acoustical insulation and where acoustical insulation is indicated over suspended ceilings. Section includes.

1. Acoustic insulation.
2. Acoustic sealants and related materials.
3. Acoustic pads, tape and gaskets.

B. Related requirements: Division 07 , 22 and 23 for thermal insulation, including pipe and duct insulation.

1.2 SUBMITTALS

A. Manufacturer Product Data for materials specified below.

1.3 QUALITY ASSURANCE

A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
2. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.

B. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
2. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.

1.4 HANDLING

A. Store materials under cover, protected from moisture and off the ground or floor.
B. Remove insulation that becomes wet or damp immediately from the job site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Acoustic sealant and pads shall prevent transmission of airborne sound through cracks in the construction.

2.2 MANUFACTURERS/PRODUCTS

A. Batt insulation:

1. Low-density glass fiber insulation: Use for packing and filling small joints and openings behind sealants.
2. Long-strand glass fiber insulation of one to 2 pcf density, without covering, thickness as required.

a. 700 Series Insulation by Owens-Corning Fiberglas.
b. Microlite by Johns Manville.
c. Toughgard Fiber Glass Duct Liner Insulation by CertainTeed.

B. High-density ceramic or mineral fiber safing:

1. For packing and filling large and/or critical openings, usually behind a sealant or putty.
2. Long-strand ceramic or mineral fiber insulation of minimum 6 pcf density, without covering, thickness as required. Mineral (glass and rock wool) fiber, flame spread and smoke developed in conformance with IBC requirements and other authorities having jurisdiction. Non combustible having a minimum density of 1.1 pcf and minimum Noise Reduction Coefficient of 1.10 at 1/3 Octave Center Frequency (Hz).

a. “QuietZone Accoustical Batts” by Owens Corning.
b. “Rockwool AFB - Acoustical Fire Batts” by Rockwooll Group.
c. "Fibrex Sound Attenuation Batt (SAFB) Insulation" by Fibrex Insulations Inc.
d. “Thermafiber” by Owens Corning.

3. Thickness; 2-1/2 inches, except as otherwise indicated.

C. Insulation in stud cavity:

1. Formaldehyde-free, unfaced fiber glass blankets, “Sound-Shield” by Johns Manville, “Greenguard” by Knauf, or equal complying with ASTM C 665, Type 1, unfaced.
2. Unless other indicated, provide insulation of same thickness as the stud depth. Select batt widths to match stud spacing and to be self supporting between the studs.

D. For application above ceilings, select batt widths to be supported on ceiling construction over the entire ceiling area.

2.3 BOARD INSULATION

A. Akousti-Liner R by Manson, or equal complying with ASTM C 1071 and the following, 2-inch thick, black insulation in rolls as long as available, meeting ASTM C 1071, with the following characteristics:

1. Fire hazard: ASTM E 84, flame spread 25 or less; smoke development 50 or less.
2. Smoke opacity: ASTM E 662.
3. ATM E 162: Exceeds requirements for surface flammability.

B. Accessories**:**

1. Impaling pins and clips: Cemco 1500 Series, Tactoo Insul-Hangers Series T by AGM Industries, Inc. or equal by Eckel Industries, Inc., of appropriate length required for insulation thickness used.
2. Adhesive for impaling pins: Made, or approved by the clip manufacturer. Do not use "peel and press" hangers with self-adhesive back.
3. Caps: Spun aluminum caps fitting pin size used.
4. Woven wire mesh: One-inch, 20-gage “Stucco Netting” 1-1/2-inch by 17-gage, zinc-coated hexagonal woven wire netting consisting of woven wire 1/18-inch diameter, by Davis Wire, “Keymesh Stucco Netting” by Keystone Steel & Wire Co., “SF Netting” by K-Lath, or equal complying with ASTM A 641 and C 1032. Paint black before installation, and touchup damaged paint when installed.]

2.4 ACOUSTIC SEALANTS & TAPE

A. Bulk sealant for closing small openings and joints up to a maximum of one-inch wide. Sealant backed with glass fiber packing, compressible joint filler or resilient backer rod. Do not use acetoxy silicone sealant where it might contact copper pipes.

1. Products:

a. Pecora Corp.: AC-20.
b. US Gypsum Co.: Sheetrock Acoustical Sealant.
c. Tremco, Inc.: Acoustical Sealant.
d. OSI Sealants: Henkel Corporation: OSI Pro-Series SC-175 Acoustical Sound Sealant.

B. Fire-barrier (acoustical) putty:

1. For closing large openings and joints typically over one inch wide. Applied full depth or backed with a dense safing, as detailed.
2. Non-shrinking, highly-adhesive, minimum 40-pcf density fire-barrier putty.
3. Products:

a. Series SSP Firestop Putty and Putty Pads by Specified Technologies Inc.
b. Nelson FSP Firestop Intumescent Putty by Chargar Corp.
c. Fiberfrax Fyre Putty by Unifrax.
d. Hilti CP 617 and CP 617L, intumescent moldable firestop putty for electrical outlet boxes.

C. Foamed-in-place silicone sealant:

1. For closing electrical ducts and cable trays where they penetrate constructions. Apply full depth of construction between permanent or temporary dams.
2. Fire-resistant, minimum 17-pcf density, foamed-in-place silicone sealant.
3. Products: Fire Barrier 2001 Silicone RTV Foam by 3M Fire Barrier Products Division.

D. Fire-resistive acoustic foam tape: “Norseal V740FR” compressible, closed cell polyvinyl chloride foam tape with pressure sensitive adhesive by Saint Gobain, or equal.

1. Provide one-inch wide by not less than 1/4-inch thick, self-extinguishing, 6 pcf density UL-listed acoustical foam tape.
2. Furnish tape in rolls with protective release liner on non-adhesive face.

2.5 ACOUSTIC PADS

A. Use: For sealing the backs and sides of standard electrical back boxes. Select size to completely cover the box and overlap wall facing material at least one-inch.

1. Fire-rated assemblies:

a. Flamesafe FSP 1077 Putty Pads by WR Grace & Co.
b. Putty Pads by Specified Technologies Inc.
c. Hilti CP617 Putty Pads by Hilti.
d. 3M Fire Barrier Moldable Putty Pads by RectorSeal.
e. Putty Pads by International Protective Coatings.

2. Elsewhere:

a. Type FSP Firestop Putty Pads by Nelson Electric.
b. Lowry’s Outlet Box Pads by Harry A. Lowry & Associates.
c. Sound Pad #68 by L.H. Dottie Co.

B. Self-adhesive sponge neoprene pads:

1. For providing a compressible filler and acoustical seal in the gaps of slip joints. Set in place with 10 to 15 percent compression. Airtight splices work in length-wise direction.
2. Closed-cell sponge or foam neoprene of 8- to 12-pcf density, self-adhesive on one side, thicknesses and widths as required.
3. Products:

    a. Type V760 Norseal Foam Sealants by American Saint-Gobain.
    b. DS Brown Co.

C. Felt-lined metal sleeves:

1. For sealing around pipe, hanger rod or other round element penetrating a construction. Inside sleeve diameter to equal outside diameter of penetrating element. Exposed end of sleeve closed with acoustical sealant.
2. Products:

    a. Pipe Isolator by Eleen.
    b. P-R Isolator by Potter-Roemer.
    c. Trisolator by Stoneman Engineering.

D. Self-adhesive bubble gaskets:

1. To seal around the edge of an operating access panels. Typically set on jamb or head frame or stop to act as a compression seal.
2. Nominal 1/4-inch by 1/2-inch compressible bulb of silicone rubber or polyprene with self-adhesive on one side.
3. Products:

    a. 5050 Self-Adhesive Gasket by National Guard Products.
    b. S88D or S88W Siliconseal by Pemko.
    c. 797 or 797W by Reese Enterprises.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Before installing insulation in stud walls, thoroughly clean space of debris.
C. Correct detrimental conditions before proceeding with installation.

3.2 ACOUSTIC PADS

A. Install acoustic pads behind all recessed boxes in walls that have acoustical insulation in their stud cavities.
B. Clean the contact area of loose and foreign material sin accordance with the pad manufacturer’s instructions.
C. Verify that all unused knockouts are plugged before installing the pad.
D. Center the pad and cover the back and sides of all electrical, telephone and CATV boxes in sound-insulated walls with the acoustical pad.
E. Mold around conduits and cables entering the box.
F. Mold pads tightly to the boxes and to the adjacent surfaces.

3.3 BATT INSULATION

A. Cut to fit irregular spaces, butt edges into firm contact with each other and adjoining surfaces.

B. Hand pack around pipes, ducts, conduits, electrical boxes, etc., as required to thoroughly fill all voids and spaces between framing members and to form a continuous acoustical barrier.
C. Comply with the California Electrical Code (CEC) for installation in proximity to light fixtures. Do not install insulation closer than recommended by CEC.
D. Where in-wall electrical conduit is parallel to the wall, slit the insulation halfway to bury the conduit in it. Where the conduit is perpendicular to the wall (penetration), do not oversize the penetration; tape the conduit to prevent sound leakage.
E. For application above ceilings, select batt width to be supported on ceiling construction over entire ceiling.

3.4 BOARD INSULATION

A. Attach insulation to solid surfaces as follows:

1. Where indicated, provide 2 layers of insulation; stagger joints between layers.
2. Provide insulation fasteners at typical spacing specified, or equivalent area for panels of a different size and for any cut panel sizes, except not less than 2 fasteners for any single piece.
3. Lay out insulation without single piece less than 24 inches wide or less than 48 inches long, unless otherwise limited by available space.
4. Offset intermediate end joints in adjacent panels and between insulation layers not less than 12 inches.
5. For 48-inch wide units follow insulation manufacturer's instructions. Provide a minimum of 8 fasteners. Space edge fasteners no more than 3-inch from edges.
6. For 24-inch wide units, comply with the above, except use no less than 6 fasteners.
7. Secure each metal clip base in full bed of adhesive as recommended by their manufacturer.
8. Do not install panels until clip adhesive is fully set.
9. Cut panels in straight lines using sharp knives to prevent fraying. If necessary, neatly and carefully precut small slots through panels to facilitate placing insulation over fasteners.
10. Install panels fully bearing against substrates, and neatly and tightly fitted at joints and around surfaces of penetrations.
11. Install fastener caps firmly against panel faces and without compressing insulation.

B. Cover insulation with woven wire mesh from wood base to height indicated; keep top of mesh level throughout the room. Staple at 6 inches o.c to supports.

3.5 ACOUSTIC SEALANT

A. Comply with ASTM C 919 and the following.
B. Clean space to be calked of debris, dust and powdered materials which would prevent the sealant from adhering properly.
C. Seal openings between gypsum board and the perimeter of items penetrating gypsum board, such as electrical boxes, continuously using sealant specified.
D. Seal openings between the gypsum board and floors and ceilings along sound-insulated walls continuously, and along those intersecting walls for a minimum distance of 3-foot from insulated walls. When multiple layers occur, seal the perimeter of each layer continuously.
E. Seal gypsum board edges in contact with door frames continuously.

3.6 FIELD QUALITY CONTROL

A. Prior to closing-in of insulated assemblies, or prior to Substantial Completion for insulation that will remain exposed in the building, refit, reinstall and/or replace wet, damaged and displaced insulation.

END OF SECTION

DIVISION 08
OPENINGS

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SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Flush steel doors.
2. Steel door and window frames.
3. Louvers and vision panel frames in steel doors.

B. Work furnished but installed in other Sections: Division 04 for building-in of anchors and grouting of frames in masonry.

C. Work installed but furnished in other Sections: Division 08 for finish hardware.

D. Related requirements:

1. Division 08 for access panels and frames, glazing vision panels in steel doors, and glazing steel windows.
2. Division 09 for finish painting the work of this Section.
3. Division 14 for elevator doors and frames.

1.2 SUBMITTALS

A. Shop Drawings: Show the following.

1. Door and frame elevations, materials, construction, gage, finish, anchoring for each wall condition, conditions of openings, vision panel and louver sizes and locations, and accessories.
2. Location and size of reinforcement for finish hardware.
3. Locations of field splice joints, including associated details to assure proper assembly at Project site.
4. Identify work that cannot be permanently factory-assembled before shipment.
5. Details of removable stops, and glazing.
6. Details of conduit and preparations for power, signal, and control systems in doors and frames.
7. Use same reference numbers for openings and details as shown on Contract Drawings.

B. Schedule: Door schedule indicating opening identification symbol, door and frame types, sizes, including thickness, swing, label requirements, louvers, and vision panels, and undercuts.

C. Samples:

1. Twenty-four-inch square Sample of door illustrating typical head, bottom and jamb conditions, cutouts for hinge, lock/latch and magnetic contact, and vision panel centered in sample.
2. Frames showing profile, welded corner joint, welded hinge reinforcement, dust cover boxes, floor and wall anchors, and silencers. Include panel and louver sections and glazing stops where applicable.

D. Data: Manufacturer or fabricator Product Data for doors, frames and shop primer, and louvers.

1.3 QUALITY ASSURANCE

A. Uniformity: Provide all steel doors and frames for the Project made by a single firm, unless otherwise acceptable to the Architect.
B. Regulatory requirements:

1. Fire-rated doors shall be listed by a nationally recognized testing and certification agency acceptable to AHJ. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. Doors shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.
2. Comply with CBC requirements. Provide tested products that passed, as an assembly, the CBC Standard 7-2 positive pressure smoke testing requirements.
3. Comply with ASTM E 2074, Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.
4. Doors in exit enclosures shall bear an “S” label.

C. Oversize fire-rated door assemblies: For units exceeding sizes of tested assemblies, provide a label or a certificate of inspection, by a testing agency acceptable to AHJA, that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

1.4 HANDLING

A. Procedure: In accordance with SDI recommendations.
B. Packing: Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.
C. Delivery:

1. Inspect doors, frames, and accessories delivered to the site for damage. Unload and store, as specified, with a minimum of handling.
2. During delivery, provide temporary steel spreaders securely fastened to the bottom of each frame.
3. Replace doors and frames damaged before installation. Do not install damaged doors and frames.

D. Storage:

1. Store doors and frames carefully under cover. Provide a minimum of 1/2-inch space between doors. Do not stack doors and frames.
2. The storage spaces shall be dry and accessible, adequately ventilated and free from dust or water, and shall permit easy access for inspection and handling.
3. Do not use non-vented plastic or canvas shelters that create a humidity chamber.
4. If doors are shipped with fiberboard wrapper and it becomes wet, remove it immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. One of the following, or equal:

1. Door Components, Inc.
2. CECO.
3. Curries Co.
4. Security Metal Products.
5. Steelcraft Manufacturing Co.
6. Stiles Hollow Metal.

2.2 MATERIALS

A. Cold rolled steel: ASTM A 1008, “Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability” and A 568, “Standard Specification for Steel Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.”
B. Hot rolled, pickled and oiled steel: ASTM A 1011, “Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability” and A 568, “Standard Specification for Steel Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.”
C. Hot dip zinc coated steel: Alloyed type complying with ASTM A 924, “Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process” and A 653, “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.” The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 oz/ft² total both sides, i.e., A40 (ZF120). Comply also with SDI-112 “Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames”.

1. When zinc-coated steel is specified for anchors and accessories, and electrolytically deposited zinc coated steel is provided, it shall comply with ASTM A 591, “Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight [Mass] Applications.” The minimum coating weight shall be a class “B”, i.e., 0.075 oz/ft².

    a. Coated steel sheets: ASTM A 653, QC classification, with a G90 or A90 zinc coating, mill-phosphatized.

D. Inserts, bolts and fasteners: Manufacturer standard units, except hot-dip galvanize all items in exterior walls.
E. Paints:

1. Shop primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A250.10, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames", and compatible with finish paint system specified in Section 09 90 00.
2. For touchup of damaged galvanized surfaces: SSPC Paint No. 20, Type II (Organic) zinc -rich primer by Tnemec, Porter International, Valspar Corp., Ameron Protective Coatings or DuPont Co.
3. For back-coating frames: 3M Undercoating Black 08881, or fibrous asphaltic compound.

F. Door filler: In compliance with SDI 250.8, except use UL-listed materials in fire-rated doors.

2.3 FABRICATION - GENERAL

A. Do not begin fabrication until the fabricator has received the hardware schedule approved by the Architect and submitted by the hardware supplier.
B. Fabricate work to required profiles by roll-forming, brake-forming and welding to produce hollow metal work with straight and square edges, with surfaces free from warp, wave, buckle, oil-canning and other defects.
C. Fabricate without grind marks, hollow or other out-of-plane areas, holes, burned-out spots, weld build-up and other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints.
D. Comply with SDI 250.8 and SDI 117, Manufacturing Tolerances Standard Steel Doors and Frames, except for the following:

1. 0.005-inch in 3-inch span anywhere on the exposed surfaces. Fill depressions with Bondo or other automotive type filler. Sand bumps down, flush with adjacent surfaces.

E. Conform to AWS standards for welding. Face weld frames with exposed welds ground flush and smooth with parent metal. Welded joints shall be invisible after assembly is painted.
F. Fabricate doors, frames and sidelights at the following locations from coated steel; garage, assemblies in exterior walls, toilet rooms and shower rooms. Elsewhere, fabricate doors and frames from coated or uncoated steel.
G. Finish hardware preparation:

1. Prepare doors to receive finish hardware, including cutouts, reinforcement as specified below, mortising, drilling, and tapping in compliance with templates provided by hardware supplier.
2. Reinforce doors to receive hardware; provide internal reinforcement of sufficient size to avoid the use of through bolts that are not permitted. Drilling and tapping for surface-applied hardware may be done at Project site.
3. Provide 16-gage (0.053-inch) stainless steel reinforcement for pull plates and bars. Provide internal reinforcement for closers on all door frames. Thru bolts (Chicago fasteners) are not permitted.
4. Locate finish hardware as accepted on final Shop Drawings.

H. Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames. Surface-applied (adhesively-applied) stops are not allowed.
I. Provide minimum 26-gage (0.0179-inch) steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
J. Steel members shall be pre-straightened, free of wind or twist. Factory-align to a diagonal tolerance of plus or minus 1/16-inch.

2.4 FLUSH DOORS

A. Standards: Comply with the following, except as specified.

1. SDI 250.8, Specifications for Standard Steel Doors and Frames (SDI-100).
2. SDI 117, Manufacturing Tolerances for Standard Steel Doors and Frames.
3. SDI 118, Basic Fire Door, Fire Door Frame, Transom/Sidelight Frame, and Window Frame Requirements.

B. Steel doors:

1. SDI Level 2 and Physical Performance Level 2 and Physical Performance level B (Heavy Duty), Model 2 (Seamless), 18-gage (0.042-inch) for doors up to 3-foot wide, and Level 3 and Level 3 Extra Heavy Duty, Performance Level A, model 2 (Seamless), 16-gage (0.053-inch) for doors wider than 3 feet Provide doors with seamless welded edges ground to be invisible from adjacent surfaces; do not use Bondo or similar material to close gap between face sheets at door edge.
2. Close the top and bottom of doors with an inverted flush channel, minimum thickness of 0.042-inch thick.
3. Close openings for vision panels and louvers with an inverted flush channel, minimum thickness of 0.042-inch thick.
4. Insulate exterior doors to provide a U factor of 0.24 BTU/hr. by square foot by degree F when tested in compliance with ASTM C 236.

2.5 FRAMES

A. General:

1. Fabricate frames to the dimensions and profiles indicated in compliance with SDI 250.8, Specifications for Standard Steel Doors and Frames (SDI-100), except as noted.
2. Reinforce and miter corners, interlock and/or weld internally. Weld faces continuously and grind smooth.

B. Stand alone door frames: Fabricate with coped or mitered, fully welded corners of steel 2-gage heavier than door face in same opening, minimum 16-gage (0.053-inch), corners reinforced, mitered, interlocked and/or welded, and visible joints continuously welded and ground smooth; non-welded joints visible in the finish work are not permitted.

C. Mullions and transom bars:

1. Closed or tubular mullions and transom bars where indicated.
2. Join mullions and transom bars at crossings and to jambs by butt-welding.
3. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
4. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.

2.6 DOOR LOUVERS

A. V, Y or Z shaped louver blades formed of 18-gage (0.042-inch) sheet steel welded to surrounding frame set flush with both sides of doors, by Air Louvers, Inc., Airolite Co., Anemostat Products Div/Dynamics Corp. of America, or Ventilouver Co. Provide same shape louver blade (V, Y or Z) throughout the Project.

B. When installed in fire-rated doors provide UL labeled, spring-actuated louver blades activated by a fusible link, or Zero International “Advantage Intumescent AI” louvers.

2.7 VISION PANELS IN DOORS

A. Make cutouts for vision panels square and parallel with door edges.

B. Provide integrally formed glass stops on security side of doors and removable glass stops on opposite side.

1. Size rabbet to fit glass thickness indicated.
2. Miter glass stop corners; square, butt joints are unacceptable.
3. Attach removable glass stops securely in place with countersunk oval head machine screws spaced equally at not more than 12 inches o.c. and 2 inches from corners.

2.8 SHOP PRIMING

A. After assembly, clean and prepare steel surfaces by removing mill scale, rust, oil, grease, dirt, and other foreign materials before painting. For coated steel, comply with ASTM D 2092 and the primer manufacturer's instructions.

1. Grind welds and fabrication marks flush and smooth with parent metal.
2. Fill depressions with metal filler before applying the shop primer.
3. Apply one or more coats of epoxy mineral filler to conceal spot welds.
4. Where zinc coating is damaged, touchup with zinc-rich primer.

B. Acid-etch galvanized surfaces before pretreating.
C. Apply shop primer, within time limits recommended by pretreatment manufacturer, to provide a smooth coat of even consistency and to produce a dry film thickness of not less than 1-1/2 mils.
D. Assemblies with visible spot welds before or after application of finish paint will be unacceptable.

2.9 BACK COATING FRAMES

A. For frames installed in concrete and CMU openings, and frames in contact with plaster, factory-coat surfaces that will be concealed after installation with the back-coating material specified applied in a uniform thickness, without holidays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that openings are within allowable tolerances, plumb, level, clean, and will provide a solid anchoring surface for frames.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLING FRAMES

A. Set frames accurately in their scheduled locations, plumb, straight, square and rigid.

1. Comply with these Specifications, the Drawings; ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames, the approved Shop Drawings and UL tested procedures and NFPA 80 for fire-rated openings. When in conflict, the most restrictive provision applies.
2. Brace frames to prevent their displacement during erection of adjacent walls.

3. Coordinate the installation of built-in anchors for wall and partition construction with related trades. Refer to Division 04 for frames in CMU walls.
4. Provide 2 anchors at head of frames exceeding 42 inches in width for frames mounted in steel stud walls.
5. Provide 3/8-inch by 2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry, continuous boxed studs, or to other structural support at each jamb.

    a. Bend top of struts to provide flush contact for securing to supporting construction above.
    b. Provide adjustable wedged or bolted anchorage to frame jamb members in compliance with UL 63.

B. Frame anchors: 18-gage (0.0478-inch) galvanized steel.

1. CMU construction: Adjustable, flat, corrugated, or perforated, Tee-shaped to suit frame size, with leg not less than 2 inches wide by 10 inches long. Provide at least 3 anchors per jamb up to 7 feet high; 4 anchors up to 8 feet height; one additional anchor for each 24 inches or fraction thereof over 8-foot high.
2. Stud partitions: Insert “nail-on” type with notched clip to engage stud, welded to back of frames. Provide at least 4 anchors for each jamb for frames up to 90 inches high; 5 anchors up to 96 inches high; one additional anchor each 24 inches or fraction thereof over 96 inches. Attach jamb anchors to studs with a minimum of four 3/8-inch diameter self-tapping screws or bolts (2 per side).

3. CMU: Anchor frame jambs with minimum 3/8-inch concealed bolts into expansion shields or inserts at 6 inches from top and bottom and 26 inches o.c., unless otherwise shown. Reinforce frames at anchor locations. Except for fire-rated openings, apply removable stop to cover anchor bolts unless otherwise indicated.

C. Provide UL-tested adjustable floor clips for all frames. Anchor clips to floor with powder-driven pins or bolts in expansion shields.
D. Leave frame spreader bars intact, wherever possible, until frames are set perfectly square and plumb and all anchors are securely attached and grouted where required.
E. Installation tolerances: Adjust door frames for squareness, alignment, twist, and plumb to the following tolerances:

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

3.3 HANGING DOORS

A. Install finish hardware in compliance with its manufacturer's templates and instructions.
B. Hang doors in compliance with their manufacturer's instructions, and adjust to the clearances specified in SDI 250.8, except as specified below, as indicated on the Drawings, or as required by UL listing and NFPA 80 for fire-rated doors.
C. Do not install doors warped, bowed, dented or otherwise damaged.

D. Adjust hardware so that doors operate freely for their entire travel, but not loosely, without sticking or hinge binding, with hardware adjusted and functioning properly.
E. Fit doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-fire-rated standard steel doors:

a. Jambs and head: 1/8-inch plus or minus 1/16-inch.
b. Between edges of pairs of doors: 1/8-inch plus or minus 1/16-inch.
c. Between bottom of door and top of threshold: Maximum 3/8-inch.
d. Between bottom of door and top of finish floor (no threshold): Maximum 3/4-inch.

2. Fire-rated doors: Install doors with clearances as required by UL listing and complying with NFPA 80.
3. Smoke-control doors: Install doors according to NFPA 105.

F. Glazing:

1. Comply with installation requirements in Section 08 80 00 and with standard steel door and frame manufacturer's instructions.
2. Secure stops with countersunk flat- or oval-head machine screws spaced equally and symmetrically not more than 8 inches o.c., and not more than 2 inches from each corner.

3.4 TOUCHUP

A. Clean damaged primer, sand smooth, re-clean and spot-prime with paint compatible with the primer and the scheduled finish coats.
B. Before application of primer, touchup galvanized surfaces with zinc-rich coating where zinc coating is removed or damaged.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Factory-finished, flush swinging wood doors.
2. Vision panel frames in wood doors.
3. Fire-rated doors where indicated on Door Schedule.

B. Work installed but furnished in other Sections: Division 08 for finish hardware.
C. Related requirements: Division 06 for wood door frames.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for the finish system.
B. Shop Drawings:

1. Door schedule indicating opening identifying number, door type, grade, size, thickness, swing, label requirements, and undercuts.
2. Door elevations indicating hand of each door, and type of construction, and conditions at cutouts for louvers and vision panels.
3. Full size molding sections.
4. Prefitting and premachining requirements, including dimensions and locations of mortises and holes for hardware.
5. Rating for fire-rated doors.
6. Use same reference numbers for openings and details as Contract Drawings.

C. Samples:

1. Submit approximately 8 by 10-inch samples of each type of factory finish applied to actual door face materials. For each wood species and transparent finish, provide set of 3 samples showing typical range of color and grain to be expected in the finished work.
2. Submit corner sections of doors, approximately 8 by 10 inches with door face and edges representing actual materials to be used.
3. Submit louver blade and frame sections 6 inches long for each material and finish indicated.
4. Submit frames for light openings 6 inches long for each material, type and finish required.
5. Approved samples will serve as Architect’s control samples.

D. Certificate: Manufacturer’s certificate showing door compliance with these Specifications and the WI.
E. Warranty: Warranty form from the door manufacturer.

1.3 QUALITY ASSURANCE

A. Regulatory requirements:

1. Fire rated doors shall be listed by a nationally recognized testing and certification agency acceptable to authorities having jurisdiction. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. Doors requiring fire-rating shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.
2. Comply with CBC requirements. Provide tested products that have passed as an assembly in compliance with CBC Standard 7-2 positive pressure smoke testing requirements.
3. Comply with ASTM E 2074, Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.

B. Uniformity: the same manufacturer shall make all flush wood doors for the Project.

1.4 HANDLING

A. Procedure: In accordance with WI Bulletin No. 416-R and Recommended Handling and Finishing Instructions for Wood Fire Doors.
B. Marking: Mark each door on top and bottom rail with opening number used on Shop Drawings.
C. Delivery:

1. Deliver prefinished doors factory-wrapped in polyethylene bags, unitized and palletized. Shrink-wrap each pallet and provide corner guards for protection.
2. Mark each door with architectural opening number in distribution and installation.
3. Do not deliver doors to the Project until proper storage space is available.

D. Storage:

1. Store doors in an assigned space having controlled temperature and humidity as recommended by WI.
2. Store doors flat on factory pallets.
3. Protect doors from construction activity and store away from direct sunlight.

E. Handling:

1. Handle doors with clean hands, except that doors to receive a transparent finish shall be handled with clean white gloves.
2. Do not drag doors across one another.
3. When provided, maintain factory packaging or other means of protection of doors until Substantial Completion.

1.5 JOB CONDITIONS

A. 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 remainder of construction period.
B. Comply with referenced WI quality standard including Technical Bulletin 419 for moisture content and relative humidity.

1.6 SPECIAL WARRANTY

A. Furnish to the Owner the door manufacturer written warranty against doors delaminating, telegraphing core through face veneer and against non-conformance with tolerance limitations of referenced quality standards for life of the installation.

B. Include reinstallation that may be required due to repair or replacement of defective doors, during the warranty period, when defect was not apparent prior to hanging.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. One of the following, or equal:

1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. VT Industries.
4. Or equal.

2.2 DOORS

A. Fire-Rated Wood Doors: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at positive pressure according to NFPA 252 or UL 10C.
B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
C. Interior Solid-Core Doors with Hardboard Faces: Three ply; particleboard cores.

1. Particleboard: ANSI A208.1, Grade LD-2. Rout cores to provide clearance for recessed areas of faces and provide full contact at remainder of faces.
2. Stiles and Rails: Softwood, 1-1/4-inch wide stiles and 2-1/2-inch wide rails. Provide 5-inch wide rails at doors indicated to receive closers.

D. Fire-Rated Solid-Core Doors: Core construction to provide fire rating indicated; faces to match non-fire-rated doors.

1. Mineral Cores: Noncombustible mineral composition material. Rout cores to provide clearance for recessed areas of faces and provide full contact at remainder of faces.
2. Stiles and Rails: 1-inch wide laminated stiles with 3/16-inch thick wood edges for doors with mineral cores. 2-inch wide wood rails. Provide 5-inch wide rails at doors indicated to receive closers.

E. Construction: Assemble with Type I adhesive.
F. Factory-fit doors to suit frame-opening sizes indicated and to comply with clearances specified.
G. Factory-machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.

1. Face veneer for doors scheduled to receive an opaque finish:

2.3 ACCESSORIES

A. Door louvers: Type L4 (chevron) for non-rated doors; Type L5 (fusible link operated for fire-rated louvers as follows, or Zero International Advantage Intumescent Al louvers.

1. Materials: 18-gage sheet steel blades welded to surrounding steel frame of same gage, set flush with both sides of doors.

2. Manufacturer: Air Louvers, Inc., Airolite Co., Anemostat Products Div/Dynamics Corp. of America, or Ventilouver Co. Provide same shape louver blade (V, Y or Z) throughout the Project.
3. Finish: Oven-cured enamel finish, color selected by the Architect.

B. Vision panel frame: The following, or equal low profile, factory-primed, UL listed and labeled where installed in fire-rate doors.

1. Model FGS-75 by Anemostat Door Products.
2. Model VLF by Air Louvers, Inc.

C. Metal edge and astragal:

1. Cold-rolled steel, 20-gage minimum, with an oven-cured enamel finish, color selected by the Architect, except that on doors with a transparent finish astragal shall be laminated with same veneer as the door face.
2. Equip pairs of labeled doors with overlapping full height astragal and metal edges to meet label requirements; apply astragal on inactive leaf pre-drilled for screws and pre-machined for specified hardware.

D. Metal frames for light openings: 18-gage, cold rolled steel sheet, factory-primed for paint finish.
E. Miscellaneous: For fire-rated wood doors provide beads and clips approved for such use.

2.4 FACTORY-MACHINING/FINISHING

A. Factory-machine doors by manufacturer or qualified distributor for cutouts, hinges, louvers, vision panels, locks and all hardware requiring routing or mortising.

1. When machining labeled doors comply with UL 10C and use caution to avoid voiding the manufacturer warranty.
2. Refer to Article 3.2 below for door clearances.

B. Prepare doors to receive finish hardware as follows:

1. Pilot drill screw and bolt holes.
2. Rout-out hinge locations.
3. Bore accurately for locks and latches.
4. Locate hardware as specified for steel doors in Section 08 11 13.

C. Factory-finishing doors:

1. For a transparent finish to match Architect’s control samples:

a. Specie: As indicated in Finish Schedule.
b. Face veneer grade: “A” Grade.
c. Face veneer match: Bookmatch match unless otherwise indicated.
d. Face veneer assembly: Center balance, unless otherwise indicated.

2. For an opaque finish: Lacquered finish to match Architect’s control samples: Comply with WDMA TR-6 or OP-6 Catalyzed Polyurethane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine frames, adjacent construction and supports.
B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLING FINISH HARDWARE/HANGING DOORS

A. Install finish hardware in compliance with its manufacturer's instructions and the requirements of Section 08 71 00. Fit accurately to doors.
B. Condition doors to average prevailing humidity in installation area prior to hanging.
C. Install louvers and vision panels square and parallel with door edges, with flush, hairline joints and fasten securely with concealed fasteners unless otherwise acceptable to the Architect.
D. Factory-fit doors to suit frame opening sizes indicated, with uniform clearances and bevels. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for labeled doors.

1. Trim non-fire rated doors by cutting equally at both edges.
2. Trim door height by cutting bottom edge, maximum 3/4-inch; trim fire rated doors at bottom edges only, in accordance with fire rating requirements.

E. Hang doors to operate freely for their entire travel, but not loosely, without sticking or hinge binding, with all hardware adjusted and functioning properly.

3.3 REPLACING DAMAGED DOORS

A. Replace doors showing chips, scratches, unbonded face veneers, glue stains, excessive warp or other damage that cannot be satisfactorily repaired, as determined by the Architect, with acceptable doors.

END OF SECTION

SECTION 08 31 16 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes access panels not provided by other trades but required for access to concealed equipment and assemblies.
B. Provide fire-rated access doors and panels where they occur in fire-rated walls.
C. Work installed but not supplied under this Section: Access panels furnished by other trades.
D. Related requirements:

1. Division 09 for finish painting access panels.
2. Other Divisions for furnishing access panels to be installed under this Section.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Field verification: Verify actual locations of supports by field measurements and indicate measurements on Shop Drawings. Coordinate tolerances of other trades that may affect the work of this Section prior to start of Shop Drawings.
B. Pre-installation meeting:

1. Prior to start of work, arrange for Project site meeting of all parties associated with work of this Section, trades whose work affect the work of this Section, and trades whose work will be affected by the work of this Section.
2. Meeting shall be attended by the Contractor, firm installing the access doors (if more than one firm, than each one shall attend), trade responsible for substrates and supports to which access doors are installed, and access door manufacturer representatives.
3. Resolve conflicts and issue minutes of the meeting, in PDF format, to all present and the Architect within 48 hours of the meeting.

C. Sequencing:

1. Coordinate installation and cooperate with mechanical and electrical trades.
2. Coordinate stud layout and other support locations to provide a firm support for the panel frame.

1.3 SUBMITTALS

A. Data: The following manufacturer Product Data.

1. For each type of door and frame indicated, including compliance with Code requirements for those in fire-resistive assemblies.
2. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings for access doors and frames.
3. Supplement with Shop Drawings as follows:

    a. Dimensioned plan and elevation of each access panels in areas accessible to the public.
    b. Show special installation conditions.

B. Shop Drawings:

1. Show fabrication and installation details of customized doors and frames.
2. Include plans, elevations, sections, details, and attachments to other Work. Superimpose plan location on piping layout Shop Drawings.
3. The Architect reserves the right to ask for the relocation of up to 10 percent of the access panels and the utilities served, within a radius of 10 feet, at no cost to the Owner.

C. Coordination Drawings: Reflected ceiling plans drawn to scale, coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following.

1. Method of attaching door frames to surrounding construction.
2. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.
3. Unless otherwise accepted by the Architect, no access panels will be allowed in hard ceilings (plaster and gypsum board) in public, and semi-public areas.

D. Samples: Samples for each door face material, at least 3 by 5 inches, in specified finish.
E. Schedule: Complete schedule of access panels, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.
F. Closeout: Keys properly tagged.

1.4 QUALITY ASSURANCE

A. All access panels for the Project shall be made by the same manufacturer.
B. In fire-resistive construction, provide fire-resistive assemblies bearing the label of a testing agency acceptable to the Building Department for the fire resistance indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection[and temperature-rise limit] ratings indicated, according to NFPA 252 or UL 10B.

2.2 MANUFACTURERS

A. Bauco Access Panel Solutions, Inc.
B. Elmdor Manufacturing Co.
C. JL Industries.
D. Karp Associates, Inc.
E. Milcor.
F. Nystrom (basis of design).
G. Williams Brothers Corp.

2.3 ACCESS PANELS

A. General: Provide trimless, prime-coated concealed hinged units, except where stainless steel is specified, equipped with flush, key-operated cam lock.
B. Models:

1. In gypsum board and plaster surfaces, except as specified below for toilet room walls: Baucoplus-II series.

a. Material: Extruded aluminum alloy 6063-T6 frames and supports complete with 5/8-inch moisture and mold resistant gypsum board inlay and galvanized internal steel corner reinforcing. Zinc-plated hardened steel screws, free pivot hinge, safety cable with carabineer hook, vinyl screw caps, and EPDM rubber gaskets.
Door: Fabricate using 2.8 mm thick extruded aluminum alloy 6063-T6 frame, screwed in place gypsum board inlay complete with galvanized internal steel corner reinforcing. Exposed top edge of frames shall have a concave meniscus rise to 0.5mm thick to accept finishing compound allowing a near invisible flush frame finish.
b. Frame: Recessed aluminum frame shall provide an edge similar to drywall bead against which the ceiling or wall surface shall be finished allowing a near invisible flush frame finish. Fabricate using 2.8mm thick extruded aluminum alloy 6063-T6 frame, complete with galvanized internal steel corner reinforcing. Frame opening complete with perimeter EPDM gasket maintaining the STC of gypsum board assembly.
c. Hinge Detail: Concealed, galvanized steel free pivot hinge shall allow all doors to open 120 degrees. All access panel doors shall be fully removable and complete with a safety cable to secure doors to panel frames with a safety cable, test rated for 135 lb. nylon coated, with crimp connections and spring snap aluminum carabiner.
d. Hinge Location: baucoplus-II panels for ceiling installation - hinged on the longest side. When baucoplus-II panels are used in a wall installation, the hinges must be located on the floor side.
e. Latching/Locking devices: Key operated cylinder lock, (2) keys per lock, keyed alike.
f. Finish: Door shall receive the same finish and paint as the surrounding surfaces.

2. Toilet rooms walls: Nystrom Type NT.

a. Material: Stainless steel, 16-gage (0.053 inch) frame and 14-gage (0.067 inch) door.
b. Trim: 22-gage (0.0299 inch) stainless steel drywall bead.

3. In fire-resistive assemblies: Nystrom Type IW or IP as required by surrounding material.

a. Material: Commercial grade cold-rolled steel with 16-gage (0.053 inch) frame and 20-gage (0.032 inch) door.
b. Insulation: 2-inch thick fire-resistive insulation sandwiched between the faces.
c. Trim: 22-gage (0.0299 inch) steel drywall bead or plaster casing bead, as required by job conditions.

4. Size: Unless otherwise indicated on the Drawings, provide minimum size to be 12-inch square opening for hand access; minimum 18-inch square for valve and actuator access; and 24-inch square for equipment access.
5. In elevator shaft(s), provide self-closing, self-locking access door operable from the elevator shaft side without a key to access hall lanterns and call buttons where exposed fasteners are prohibited.
6. Exterior Flush Access Doors: Provide weatherproof assembly, with face of door fit flush with frame and with exposed frame. Include extruded door gaskets and minimum 2-inch-thick fiberglass insulation equal to Nystrom Type XTM.

2.4 MATERIALS

A. General:

1. Provide sheet metal selected for its surface flatness, smoothness and absence of surface blemishes where exposed to view.
2. Do not use materials where exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discoloration or other imperfections.

B. Galvanized steel sheet: ASTM A 653 CQ (commercial quality), or ASTM A 653 LQ (lock-forming quality), coating designation G90, mill-phosphatized, stretcher-leveled.
C. Steel sheet: Commercial quality cold-rolled carbon steel sheet, stretcher-leveled, complying with the following requirements at the fabricator's option.

1. Electrolytic zinc-coated steel sheet: ASTM A 591, with Class C zinc coating; chemically treated in mill with phosphate solution and light chromate rinse.
2. Cold-rolled steel sheet: ASTM A 1008.

D. Stainless steel sheet: ASTM A 167, Type 302 or 304, stretcher-leveled.
E. Hardware:

1. Hinges: Concealed spring hinges or concealed continuous piano hinge set to open 175-degree. For fire-resistive units, provide self-closing mechanism.
2. Locking device: Flush, screwdriver-operated cam lock of number required to hold door in flush, smooth plane when closed.
    a. In public areas, provide keyed-alike cylinder lock on all access panels Where shown or scheduled, provide one cylinder lock per access door. Furnish 2 keys per lock.
    b. For recessed panel, provide access sleeves for each locking device. Provide plastic grommets installed in holes cut through finish.
    c. For locks on panels 24 inches in any dimension, provide interior latch mechanism to allow door to be opened from the inside without a key.

2.5 FABRICATION

A. Fabricate to profiles indicated without exposed cut edges.
B. Produce flat, flush surfaces without cracking and grain separation at bends.
C. Continuously weld exposed joints and seams; grind, fill, and dress welds to produce smooth flush exposed surfaces in which welds are invisible after final finishing is completed.
D. Provide exterior access panels with weatherproof extruded door gasket.
E. Finish:

1. When installed in ceramic tile surfaces, provide stainless steel panels finished with a NAAMM No. 4 (brushed) finish.
2. When installed in an exterior wall or soffit, including access panels in the Garage fabricate assemblies from commercial quality carbon steel sheets complying with ASTM A 653 CQ, hot-dip galvanized to comply with ASTM A 924, G90, or hot-dip galvanize after fabrication to provide an equivalent zinc coating weight.
3. Elsewhere provide access panels with a baked-on rust-inhibitive primer.

F. Identification: Mark inside surface of access doors with colored dot in accordance with the following color code.

1. Domestic Cold Water: Yellow.
2. Domestic Hot Water and Return: Yellow.
3. Fire Protection: Red.
4. Waste and Vent: Green.

5. Interior Rainwater Leaders: Green.
6. Natural Gas: Yellow.
7. Condensate: Green.
8. Reclaimed Water: Purple.
9. Gray Water: Green.
10. Treated Gray Water: Yellow and Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that openings are properly framed, within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
C. Correct detrimental conditions proceeding with installation.

3.2 INSTALLATION

A. Install plumb, level, and square with adjacent construction.
B. Attach assemblies securely to supports.
C. When installed in ceramic tile surfaces, coordinate panel location with the tilework so that the panel will align and fit within the tile module with no tile cutting, or a minimum of cutting.

3.3 FIELD QUALITY CONTROL

A. Adjust hardware for proper function so panels operate freely, but not loosely, without sticking or hinge binding.

END OF SECTION

SECTION 08 43 13 - ALUMINUM-FRAMED EXTERIOR GLAZED ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following assemblies requiring deferred approval:

1. Aluminum-framed storefront framing.
2. Aluminum-framed glazed doors.
3. Aluminum mullion covers, subframes, reinforcement and anchors, and sealants for the work of this Section.
4. Aluminum windows.
5. Glass and glazing for the work of this Section.

B. Work installed but furnished in other Sections:

1. Division 08 for finish hardware on doors.

C. Related requirements:

1. Section 08 71 00 for door hardware.
2. Section 08 80 00 for glazing requirements for the work of this Section.

1.2 ADMINISTRATIVE REQUIREMENTS

A. The work of this Section requires deferred approval and delegates design to the Contractor. The work of this Section has not been engineered and is not fully detailed on the Drawings, which indicate desired profiles and design intent.

1. The Contractor is responsible for engineering, fabricating and installing the exterior glazed assemblies to withstand loads and other criteria prescribed by Code, indicated, and specified, within the physical limitations indicated on the Drawings.
2. A California-licensed professional engineer employed by the Contractor shall prepare drawings and calculations for this work, and seal and sign same.

B. Pre-installation meeting:

1. Prior to start of installation, schedule a pre-installation meeting between the product manufacturer’s authorized representative, the Contractor, the installer for the work of this Section, and the Architect, to review substrate and supports to receive this work, adjacent work, the Drawings, and the Specifications.
2. Review the following:
    a. Submittals.
    b. Pre-installation preparation.
    c. Installation procedures.
    d. Sequencing and installation priority for the work of this Section and those of adjacent materials.
    e. Inspection, testing, protection and repair procedures.

3. Identify areas of concern and proposed remedial measures. Take photographs of the areas of concerns, before and after remedial measures are taken.
4. Record meeting minutes and distribute PDF copy to all concerned, including the Architect, within 48 hours of the meeting.

1.3 DEFINITIONS

A. Definitions: Aluminum-framed storefronts, glazed doors and windows are referred as “assemblies” herein.
B. Design engineer: Means the California-licensed professional engineer employed by the Contractor or the manufacturer to provide services specified herein.

1.4 SUBMITTALS

A. Data: List of manufacturers’ Product Data for manufactured and fabricated products and components proposed for use, including Data for self-drilling fasteners.
B. Shop Drawings:

1. Large scale dimensioned Shop Drawings for the work of this Section showing the following:

a. Elevation of each assembly.
b. Detail sections of typical composite members.
c. Member profiles.
a. Provisions for horizontal and vertical expansion.
b. Interface with adjacent materials/assemblies, including method of bridging gaps between frame of glazed assemblies and adjacent materials. Unless otherwise indicated, single line of sealant to prevent air and water infiltration may be rejected by the Architect; concealed, flexible, self-adhered flashings are preferred.
c. Joinery.
d. Anchorage.
e. Expansion provisions.
f. Flashings and drainage.
g. Provisions for adjustment of anchors relative to tolerances of building structure: Indicate maximum structure deviation which the anchor can accommodate (level, up, down, in and out) at edge of slab, columns and corners.
h. Hardware schedule, operating hardware types, quantities, and locations, including mounting heights.
i. Glazing details. Dimension position of glass edge relative to metal daylight.
j. Relative layout of adjacent beams, columns, and slabs, all dimensioned.
k. Wiring diagram for electrically-operated doors and doors that interface with the fire alarm and security systems.
l. Identify shop and field sealants by product name and locate on Shop Drawings.
m. Identify welds, both shop and field, by AWS welding symbols.

C. Layout drawings:

1. Prepare drawings for fasteners and anchors to be embedded in concrete showing type, location, setting-out dimensions and acceptable setting tolerances.
2. Provide complete floor plans, elevations (if required) and full-size details of the embedded anchorage along with a fully coordinated set of structural calculations.
3. Include details of each type of embedded anchor and/or fixing.
4. Draw details full size with complete notes.

5. Identify areas of the building to which the work of this Section is attached with embedded anchorage and areas of the building to which the work of this Section will be attached without the use of embedded anchorage.

D. Samples:

1. Cutaway Sample: Samples of each type of vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following.

   a. Joinery.
   b. Anchorage.
   c. Expansion provisions.
   d. Glazing.
   e. Identify Samples gage, alloy, color and finish.
   f. Flashing and drainage.

2. Glazing gaskets: 12-inch long Samples.

E. Calculations: Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind and dead load on framing members, anchors, and concrete inserts.

1. Show section property computations for framing members. Show vertical and horizontal loads on curbs and other supports. Existing test reports will be acceptable substitute for calculations.
2. Do not increase allowable stresses or decrease applied loads for design wind loads, or wind loads in combination with other loads, where not permitted by Code, or if resultant allowable stress after increase is greater than or equal to yield stress.

F. Certified test results: Certified test results showing that assemblies have been tested by recognized testing laboratories or agencies and comply with specified performance characteristics.
G. Certification: Certified test results showing that assemblies identical to those specified have been tested by a recognized testing laboratory or agency and comply with specified performance requirements.

1.5 QUALITY ASSURANCE

A. Fabricator/installer qualifications: Single firm with a minimum of 5 years of successful experience fabricating and erecting work similar to that required for this Project.
B. Engineering responsibility:

1. Engineer, fabricate, assemble and erect the work of this Section to meet or exceed the specified design and performance criteria, and to provide watertight, structurally sound, self-draining assemblies conforming to governing codes and regulations.
2. The assemblies shown on the Drawings and specified herein are intended to define design intent and minimum performance requirements. Do not change indicated profiles without the Architect's written consent.
3. Fasteners and connections are shown schematically. The Contractor’s design engineer shall determine final types and sizes.

   a. In no case shall the fasteners or connections conflict with or require revision of the finish profiles of the assemblies or the supporting work.

b. Connections to the supports shall not impose eccentric loading or induce twisting or warping.
c. Connections to the structural frame shall be able to accommodate misalignment of the steel structure within limits allowed by the AISC tolerances.

C. Regulatory Requirements: Comply with provisions of the following:

1. Accessibility requirements: Comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:
2. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

1.6 HANDLING

A. Procedure: In accordance with AAMA "Care and Handling of Architectural Aluminum from Shop to Site".

1.7 SPECIAL WARRANTY

A. Special assembly warranty: Manufacturer standard form in which manufacturer agrees to repair or replace components of glazed aluminum assemblies that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period. Repair or replace, when repairs are acceptable to the Owner, defective materials and workmanship during the warranty period at no cost to the Owner.

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

a. Penetration of water into the building thru glazed aluminum assemblies.
b. Air infiltration exceeding specified limits.
c. Structural failure of components resulting from forces within specified limits.
d. Discoloration or fading, excessive non-uniformity, pitting, cracking, peeling, or crazing of finish or corrosion.
e. Failure to fulfill other specified performance requirements.
f. Failure of operating parts to function normally.

2. Warranty period: 10 years from Substantial Completion.

NOTE: The terms below used in conjunction with finish warranty above are defined as follows.

a. "Excessive fading": A change in appearance which is perceptible and objectionable as determined by the Architect when viewed visually in comparison with the original color range standards.
b. "Excessive non-uniformity": Non-uniform fading during the period of the guarantee to the extent that adjacent parts have a color difference greater than the original acceptable color range.
c. "Will not pit or otherwise corrode": There shall be no pitting or other type of corrosion discernible from a distance of 10-foot, resulting from the natural elements in the atmosphere at the Project site.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E 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, peeling, or chipping.

2. Warranty Period: Five years from date of Substantial Completion.

C. Sealants: Refer to Section 07 92 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Aluminum-framed doors:

1. Type: Medium stile.
2. Manufacturer: One of the following meeting the requirements specified but must be manufactured by the same firm as the storefronts.

a. Arcadia, Inc. - basis of design.

1) Storefront: Arcadia 451T.

b. Or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Performance: Assemblies shall withstand and accommodate the effects of the following without exceeding performance criteria and without failure due to defective manufacture, fabrication, installation, and other defects in construction.

1. Movements of supporting structure 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, including permanent set or deformation.
b. Thermal stresses transferred 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.

4. Deflection of framing members when subjected to dead and live loads:

a. 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, whichever is less.
b. Deflection parallel to glazing plane: Limited to L/360 of clear span or 1/8-inch, whichever is smaller, but in no case by an amount which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8-inch and clearance between members and operable units directly below them to less than 1/16-inch.

5. Structural-test performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows.

   a. When tested at positive and negative wind-load design pressures, systems must not evidence deflection exceeding specified limits.
   b. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, must not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   c. Test duration: As required by design wind velocity, but not fewer than 10 seconds.

6. Air infiltration: Provide assemblies with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/square foot when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 psf.
7. Water penetration under static pressure: Provide assemblies 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 psf.
8. 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 psf.

   a. Maximum water leakage: No uncontrolled water penetrating assemblies or water appearing on systems' normally exposed interior surfaces from sources other than condensation is allowed. Water leakage does not include water controlled by flashings and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

9. Thermal movements: Provide assemblies that allow for thermal movements resulting from the maximum change (range) in ambient and surface temperatures specified below without 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. Base movements for a minimum material temperature increase of 100-degree F and decrease of 50-degree F relative to time of installation.
   b. For thermal design, the design winter surface temperature shall be plus 20-degree F.
   c. The design summer surface temperature shall be at least 170-degree F.
   d. Components, including adhesive and sealants, shall be capable of withstanding without failure design winter temperature to design summer temperature with simultaneous specified loads.

10. Assume a building interior temperature range of 50- to 80-degree F.

11. Condensation resistance: Provide assemblies with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
12. Sound transmission:
    a. Provide assemblies with fixed glazing and framing areas having the following sound-transmission characteristics:
    b. Sound transmission class (STC): Minimum 35 when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
13. Structural sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
    a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
    b. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

B. Load transfer: Framing members shall not transfer stresses, including those caused by thermal and structural movement, to glazing units.
C. Wind loads:
    1. Static-pressure test performance (exterior assemblies): Provide assemblies that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
        a. Test pressure: 150 percent of inward and outward wind-load design pressures.
        b. Duration: As required by design wind velocity; fastest one mile of wind for relevant exposure category.
D. Dead loads:
    1. Provide glazing members that will not deflect an amount, which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
    2. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
    3. Provide a minimum 1/16-inch clearance between members and doors.
E. Live loads: Provide assemblies, including anchorage, that accommodate the supporting structure deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
F. Movements of the structural support: Provide assemblies that accommodate structural movements including, but not limited to, sway and deflection.
G. Dimensional tolerances: Provide assemblies that accommodate dimensional tolerances of building frame and other adjacent construction.

2.3 SYSTEMS

A. See drawings for systems based on Arcadia.

2.4 MATERIALS

A. See Section 01 60 00 for product requirements.
B. Aluminum:

1. Extrusions: 6063-T5 alloys. Provide a minimum nominal wall thickness of 1/8-inch for structural members and 1/16-inch for non-structural members.
    a. Standard commercial tolerances listed in AA "Aluminum Standards and Data" apply to finished, fabricated and assembled materials, except
    b. Provide stricter tolerances where required to assure proper functioning of glass and glazing materials.

2. Sheet: 3003-H14 alloys. Provide a minimum nominal thickness of 3/16-inch. Standard commercial tolerances listed in AA "Aluminum Standards and Data" apply to finished, fabricated and assembled materials.
3. Surface flatness and edges: For exposed work provide materials that are cold-rolled, cold-finished, cold-drawn, extruded, stretcher-leveled, machine cut and otherwise produced to the highest commercial standard for flatness with edges and corners sharp and true to angle or curvature as required.

C. Steel mullion reinforcement, if required by wind loading and other considerations: Proprietary bent steel plate or structural steel shape complying with the following.

1. Hot-rolled sections: ASTM A 36.
2. Structural tube framing: ASTM A 500, Grade B.

D. Fasteners:

1. General: Aluminum, non-magnetic stainless steel or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
2. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
3. Exposed fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
    a. Provide Phillips flat-head machine screws for exposed fasteners.

4. Welding electrodes: As recommended by AWS for the type of metal to be welded and the conditions of use.

E. Brackets: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide non-magnetic stainless steel or steel complying with ASTM A 386.
F. Shims:

1. At static connections use high impact polystyrene solid shims. Horseshoe shims are allowed at static connections only.
2. At dynamic anchor conditions, use Nylatron isolating slip pads with hard round holes

G. Weatherstripping:

1. Compression weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
2. Sliding weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.

H. Glass and glazing materials: Guardian SunGard SNX 62/27 one-inch double-glazed IGU unless otherwise indicated on the Drawings or specified in Section 08 8000.

I. Sealants and backup rods:

1. Glazing sealants: Refer to Section 08 8000.
2. Within assemblies: Manufacturer standard non-drying, non-skinning sealant complying with AAMA 809.
3. Between assemblies and adjacent materials: As specified in Section 07 9200.

J. Isolation tape:

1. Tremco 440.
2. 3M EC1202.
3. Tremco Presstite 579.6.

K. Foam insulation: Closed-cell polyurethane. Use in mullions and closure pieces that cannot be insulated during or after assembly.

L. Paint:

1. Exposed metal surfaces: See below.
2. Shop primer for ferrous metal: Manufacturer or fabricator standard, fast-curing, lead-free, universal rust-inhibitive alkyd primer complying with performance requirements of FS TT-P645.
3. Shop primer for concealed aluminum surfaces: Alkyd barium metaborate made by one of the manufacturers listed in Section 09 9000, or bituminous paint.
4. Galvanizing repair paint: SSPC Paint No. 20, Type II (Organic), by Tnemec, Porter International, Valspar Corp., Ameron Protective Coatings, or DuPont Co.
5. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12 but containing no asbestos fibers.

2.5 FABRICATION

A. Furnish Shop Drawings, inserts and similar items to other trades, at appropriate times as required for proper sequence of construction.

1. Verify dimensions of the supporting structure and other elements that precede this work before fabrication of the required components.
2. Provide erection tolerances corresponding with specified tolerances for other work wherever field measurements cannot be obtained.

B. Maintain the visual design concept shown, including member sizes, profiles and alignment of components.

C. Fabricate and assemble components with proper and acceptable provision for noiseless thermal expansion and contraction, fabrication and erection tolerances, adjoining building component tolerances, and dynamic movements.

D. Fabricate and assemble components with minimum perimeter clearances and shim spacing, but enable installation and dynamic movement of perimeter seals.
E. Removable members such as glass stops, fillers or closures shall be extruded, and securely engaged into adjacent components. Fabricate extrusions to eliminate edge projection, bowing, and misalignment at joints.
F. Design and construct expansion joints so that they will be, and remain, permanently watertight, and will accommodate weather and building dynamics.
G. For surfaces exposed to view employ only materials which are free from alloy defects, die marks, scratches, streaks and other surface blemishes.
H. When using aluminum sheets, use material light enough to permit workability but heavy enough to accurately retain the brake shape or contour without oil-canning when fastened to backing or blocking.
I. Complete the fabrication and assembly of the components in the shop to the greatest extent possible to minimize field cutting, splicing, fastening, sealing and finishing.

1. Maintain provisions for expansion and movement.
2. Disassemble only as necessary for shipment and erection.
3. Provide secure attachment and support at joints, with hairline, flush fit between contacting members.

J. Complete the cutting, fitting, forming, drilling and grinding of metal before cleaning and applying specified finish. Remove arrises from cut edges and ease edges and corners to a radius of approximately 1/64-inch minimum, 1/32-inch maximum.
K. Welding:

1. Comply with industry standards for assembly and fabrication using system and rods for exposed metals that will provide texture match with materials being joined.
2. Grind exposed welds smooth and flush with parent metal using clean grinding wheels of a type that will not result in stains or discoloration.

L. Hardware:

1. Cut, reinforce, drill and tap doors and frames at the factory to receive hardware.
2. Provide hardware reinforcement of stainless steel or hot-dip galvanized steel secured by welding or stainless-steel screws.

M. Door fabrication:

1. Make proper allowance for clearances at jambs, meeting stile of pairs, head and threshold thickness and clearance.
2. Equip meeting stiles on pairs of doors with an adjustable astragal.
3. Close the top of out-swinging doors with a plate or inverted channel.

2.6 FINISHING

A. Exterior exposed aluminum systems:

1. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

a. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].
b. Color and Gloss: Custom color, selected by Architect...

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
C. Examine wall flashings, water and weather barriers, and other built-in components to ensure a coordinated, weathertight installation.
D. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. General:

1. Do not install defective components, including warped, bowed, dented, abraded and broken members, and glass with damaged edges.
2. Remove and replace members that have been damaged during installation or thereafter before final acceptance.
3. Do not cut, trim, or weld components during erection in a manner that would damage the finish, decrease their strength, or result in a visual imperfection or a failure in performance of the work.
4. Return components that require alteration to the shop for refabrication or replacement.
5. Install components level, plumb, true to line and with uniform tight joints and reveals. Attach to structure with non-staining and non-corrosive shims, anchors, fasteners and spacers.
6. Provide all accessories such as fastenings, sealants and concealed anchorage needed for a complete weatherproof installation.
7. Protect unpainted aluminum surfaces that will be in contact with cementitious and dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

B. Erection tolerances:

1. Provide adjustment within the assemblies to accommodate job variations.
2. Install the work of this Section within the following tolerances:

a. Deviation from established vertical, horizontal, or designed position shall not exceed 1/8-inch in 12 feet of length of any member, or 1/4-inch in any total run in any line.
b. Maximum offset from true alignment between 2 consecutive members placed end-to-end shall not exceed 1/16-inch.
c. Maximum offset between glass framing members at corners of glazing pocket must not exceed 1/32-inch.

C. Assembly and anchorage:

1. Anchor components securely by bolting, welding or other permanent mechanical attachments system that will comply with specified requirements and permit movements that are intended or necessary.
2. Install slip-joint linings where required to ensure movement without damage of the components.
3. Provide tape separator or asphalt paint between contact surfaces of dissimilar materials where there is a possibility of corrosive or electrolytic action, but in all cases between dissimilar metals and where aluminum will contact with cementitious materials.
4. Remove weld slag and apply primer over welds. Touchup shop applied paint damaged by welding or other causes.

D. Glazing:

1. Glaze assemblies as specified in Section 08 80 00.
2. isolate glazing physically and thermally from framing members.
3. Carefully match joints of glazing beads. Drive screws securing beads fully and tighten with heads firmly seated.

E. Hanging doors:

1. Install finish hardware on doors in compliance with the hardware manufacturer's instructions.
2. Hang doors with minimum clearance to frame and threshold to meet the performance criteria specified.
3. Hang doors and adjust hardware so doors operate freely for their entire travel, without sticking or binding, and with minimum clearance to frame to comply with performance criteria specified.

3.3 SEALANTS

A. The requirements of Section 07 92 00 apply to sealants used in this work.
B. Seal all joints in the glazed assemblies, except those designed or constructed to drain condensation water to the outside (weepholes), and between this work and adjacent construction so they are weathertight. Where joint is too wide to use sealant bead, use DOWSIL 123 silicone tape but only in locations concealed from view.

3.4 FIELD QUALITY CONTROL

A. Field water tests may be performed on completed glazed portions of the assemblies at the Owner's option in compliance with ASTM E 1105.

1. Provide hose and sufficient personnel to conduct the tests.
2. Should the tests demonstrate that the assemblies meet the requirements specified, the Owner will pay for the tests – cost to be negotiated between the Owner and Contractor prior to start of tests.
3. In the event that such testing should result in uncontrolled leakage, eliminate the cause(s) of such leakage at no additional cost to the Owner.

B. Touchup: Touchup damaged finish when results are satisfactory to the Architect, otherwise return the damaged component to the shop for refinishing.

3.5 ADJUSTING

A. Adjust door hardware for smooth operation according to hardware manufacturers' instructions.
B. Adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

END OF SECTION

SECTION 08 60 00 - ALUMINUM-FRAMED SKYLIGHT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Skylight framing and glazing.
2. Flashings at perimeter of skylight.
3. Closure pieces, clips and angles.
4. Gaskets and sealants for the work of this Section.
5. Supplementary parts and components, such as inserts, clips, fasteners, anchors and other miscellaneous supports required for a complete, weatherproof installation.

B. Related requirements:

1. Division 07 for flashings other than for skylight.
2. Sealants other than specified herein.
3. All other glass and glazing.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Deferred approval: The work of this Section requires deferred approval and delegated design, including comprehensive engineering analysis by a California licensed qualified professional engineer, to meet the performance requirements and design criteria indicated.

B. Pre-installation meeting:

1. Prior to start of installation, arrange a pre-installation meeting between the glass and skylight system manufacturers authorized representatives, the Contractor, the installer, the glazier, and the Architect to review the Drawings and Specifications, the glass and sealants manufacturers' data, and conditions of framing to be glazed, as well as other conditions that would affect the quality and permanence of this work.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Review all typical and atypical details to verify the method(s) of installation that the Contractor intends to follow, as well as required corrective actions.
4. Special conditions not specifically referenced or addressed by the Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified and reviewed.
5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions to determine what actions need to be taken to assure an installation that will meet the requirements of the Contract Documents, and will be acceptable to the assembly/material manufacturer to issue the warranties specified.
6. Record meeting minutes and distribute electronic copy to attendees and others concerned, within 48 hours after the meeting.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data for the skylight assembly.

B. Shop Drawings: Large scale, dimensioned shop and erection drawings for skylight. Show the following.

1. Joinery techniques, provision for horizontal and vertical expansion, glass and metal thicknesses, and framing member profiles. Identify all materials including metal alloys, glass types, fasteners, and glazing materials.
2. Provisions for adjustment of anchors relative to tolerances of building structure: Indicate maximum structure deviation which the anchor can accommodate (level, up, down, in and out) at edge of slab and beams.
3. Identify shop and field sealants by product name and locate on Shop Drawings. Show relative layout of adjacent beams, columns, and slabs, correctly dimensioned.
4. Show interface with adjacent and abutting materials.
5. Dimension position of glass edge relative to metal daylight.
6. Identify shop and field welds by AWS Welding Symbols, A2.0.

C. Samples:

1. Twelve-inch Samples of production-run aluminum extrusions with the specified finish, and a corner assembly showing typical skylight construction.
2. Cutaway sample: Of framing intersection, made from 12-inch long lengths of full-size components and showing details of the following.

    a. Primary members.
    b. Joinery.
    c. Anchorage.
    d. Expansion provisions.
    e. Glazing.
    f. Flashing and drainage.

D. Structural calculations: Prepare and submit structural calculations for the skylight.

1. Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind, seismic, live and dead loads on framing members, anchors, and concrete inserts.
2. Show section property computations for framing members.
3. Show vertical and horizontal loads on curbs and other supports.
4. Existing test reports will be acceptable substitute for calculations.
5. Calculations shall be signed and stamped by a California-licensed professional engineer.
6. Do not increase allowable stresses or decrease applied loads for design wind load, seismic load, or those loads in combination with other loads, where not permitted by Code, or if resultant allowable stress after increase is greater than or equal to yield stress.

E. Building Department approval: Submit reviewed Shop Drawings, calculations and other supporting data required by the Building Department for its review and approval. Pay applicable fees resulting therefrom.
F. Preconstruction test reports: Indicate and interpret test results for compliance with requirements.
G. Product test reports: From a qualified testing agency indicating that skylight complies with the specified requirements, based on comprehensive testing of current products.
H. Sealant compatibility and adhesion test reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.
I. Field test reports: Indicate and interpret test results for compliance with requirements.

J. Closeout: Furnish the Owner a comprehensive plan for replacement of broken glass. Include a local source.

1.4 QUALITY ASSURANCE

A. Fabricator/installer qualifications: Single firm which can show a minimum of 5 years of successful experience in fabricating and erecting skylight similar to that required for this Project.
B. Engineering responsibility:

1. Engineer, fabricate, assemble and erect the skylight to meet or exceed the criteria specified, and to provide watertight, structurally sound, self-draining assembly conforming to governing codes and regulations.
2. Fasteners and connections are shown schematically. A California-licensed professional engineer employed by the Contractor shall determine final types and sizes.
    a. In no case shall the fasteners or connections conflict with or require revision of the finish profiles of the skylight or the supporting work.
    b. Connections to the structural frame shall not impose eccentric loading, or induce twisting or warping.
    c. Connections to the structural frame shall be able to accommodate actual and potential misalignment of the steel structure within limits allowed by the AISC tolerances.

C. Professional engineer qualifications:

1. Professional engineer legally qualified to practice in California and experienced in providing engineering services of the kind indicated.
2. Engineering services are defined as those performed for installations of skylight that are similar to those indicated for the Project in material, design, and extent.

D. Testing agency qualifications: Independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
E. Preconstruction sealant compatibility and adhesion testing: Submit to sealant manufacturer, for testing indicated below, Samples of materials that will contact or affect joint sealants.

1. Use manufacturer's 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 9 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 sealant manufacturer's instructions for corrective measures, including the use of specially formulated primers.

F. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum".
G. Mockup: Before installing skylight, build a mockup in a location acceptable to the Architect. Build mockup to comply with the following requirements, using materials indicated for the completed Work.

1. Demonstrate the proposed range of aesthetic effects and workmanship.
2. Obtain Architect's approval of mockup before starting fabrication.
3. Maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.
4. Demolish and remove mockup when directed.
5. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 HANDLING

A. Procedure: "Care and Handling of Architectural Aluminum from Shop to Site" published by AAMA.

1.6 SPECIAL WARRANTY

A. Warrant skylight against defective materials and workmanship for 5 years after Substantial Completion.
B. Written warranty, executed by manufacturer agreeing to repair or replace components of assemblies that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failure.
2. Sealant failure.
3. Failure of system to meet performance requirements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylight from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.

C. Repair or replace defective materials and workmanship during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. One of the following:

1. Wasco – Velux Commercial.
2. Metcoe Skylight Specialties, Inc.
3. O'Keeffe's, Inc.
4. Super Sky Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Performance - General: Skylight shall withstand the effects of the following without failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Structural loads, both wind and live loads..
2. Seismic and thermal movements.
3. Movements of supporting structure.

4. Dimensional tolerances of support system and other adjacent construction.
5. Failure includes, but is not limited to, the following:

    a. Deflection exceeding specified limits.
    b. Thermal stresses transferred to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    d. Glazing failure and disengagement from frame.
    e. Glazing-to-glazing contact.
    f. Noise or vibration created by wind, and by thermal and structural movements.
    g. Loosening or weakening of fasteners, attachments, and other components.
    h. Sealant failure.

B. Structural loads:

1. Wind: As indicated on Drawings.
2. Seismic: As indicated on Drawings.
3. Live load: 250 psf concentrated, unless otherwise prescribed by Code.

C. Deflection of framing members when subjected to loads specified shall not exceed the following:

1. Deflection normal to glazing plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 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, whichever is less.
2. Deflection parallel to glazing plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

D. Lateral bracing of framing members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.

E. Structural-test performance: Provide skylight tested according to ASTM E 330, as follows.

1. When tested at positive live loads, and positive and negative wind-load design pressures, assemblies shall not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, shall not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test durations for wind load: As required by design wind velocity, but not less than 10 seconds.

F. Air infiltration: Provide skylight with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. foot of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/square foot

G. Water penetration under static pressure: Provide skylight 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/ square foot

H. Water penetration under dynamic pressure: Provide skylight 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/ square foot.

1. Maximum water leakage: No uncontrolled water penetrating skylight, or water appearing on systems' normally exposed interior surfaces, from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

I. Thermal movement:

1. Base movements for a minimum material temperature increase of 100 degrees F and decrease of 50 degrees F relative to time of installation.
2. For thermal design, the design winter surface temperature shall be plus 30 degrees F.
3. The design summer surface temperature shall be at least 180 degrees F.
4. Components including adhesive and sealants shall be capable of withstanding without failure design winter temperature to design summer temperature with simultaneous specified loads.
5. Assume a building interior temperature range of 50 to 80 degrees F.

J. Condensation resistance: Provide skylight with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

2.3 MATERIALS

A. Framing members: Extruded aluminum alloy ASTM B 221, 6063-T5 or 6061-T6.

1. Extrusions: ASTM B 221.
2. Sheet and plate: ASTM B 209.
3. Bars, rods, and wire: ASTM B 211.

B. Concealed flashing: Stainless steel or other corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials. Do not use galvanized steel.
C. Exposed flashing and closures: Aluminum sheet 0.060-inch thick.
D. Fasteners and accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories; compatible with adjacent materials.

1. Movement joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
2. Aluminum retaining cap fasteners: ASTM A 193, Series 300 stainless-steel screws; type as recommended by manufacturer.
3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
4. Anchor bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
5. Concrete or masonry inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.

E. Exterior caps: Extruded aluminum alloy 6063-T5. Minimum thickness 0.120-inch.
F. Aluminum flashings: Alloy and temper selected by the fabricator. Minimum thickness 20-gage.
G. Fasteners: Finish fasteners exposed to view to match aluminum framing systems.

1. Exposed to view: 302/304 series stainless steel.
2. Used for bolting aluminum extrusions and their connecting members: 2024-T4 aluminum or stainless steel.
3. Used for the attachment of the skylight to the supporting curbs: Cadmium-plated or hot-dip galvanized steel.

H. Welding electrodes: As recommended by AWS and the aluminum manufacturer for the conditions of use and the alloys being welded.
I. Glass and glazing materials: As indicated on the Drawings and specified in Section 08800.
J. Framing system gaskets and joint fillers: Manufacturer's standard permanent gaskets and joint fillers for sliding, compression, and nonmoving joints.
K. Paint:

1. For finish on exposed surfaces: Match finish on Curtain Wall system.
2. For concealed ferrous metal surfaces: Tneme-Zinc 90-93 by Tnemec, Zinc-Lock 308 by Porter International, or MZ-4 Epoxy Zinc-Rich Primer by Valspar Corp.
3. Bituminous paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.

L. Sealants and backer rods:

1. Within assembly: Manufacturer's standard non-drying, non-skinning sealant complying with AAMA 809.2.
2. Between assembly and adjacent materials: As specified in Section 07 92 00.

2.4 GLAZING MATERIALS

A. Glass: As scheduled and specified in Section 08 80 00.
B. Glazing gaskets:

1. Manufacturer's standard pressure-glazing gaskets of elastomer type and hardness selected by skylight and gasket manufacturers to comply with requirements.
2. Provide gasket assemblies with corners sealed with sealant recommended by gasket manufacturer.

C. Spacers, edge blocks, and setting blocks:

1. Manufacturer standard permanent nonmigrating type of elastomer type and hardness selected to comply with requirements.
2. For structural silicone glazing, provide bond-breaking spacer gaskets and bonding setting blocks compatible with silicone sealants.

D. Structural silicone sealant: ASTM C 1184, compatible with components with which sealant comes in contact, formulated and tested for use as a structural sealant, and neutral curing.

1. Color: Black.
2. Tensile strength: 100 psi minimum.
3. Provide sealant with modulus of elasticity that will not allow movement of more than 25 percent of joint width, unless less movement is required by skylight system design.

2.5 FABRICATION

A. General:

1. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
2. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.

3. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
4. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
5. Fit and secure joints with screw and spline, internal reinforcement, or welding.
6. Reinforce members to retain fastener threads.
7. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
8. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.

B. Maintain the visual design concepts shown, including member sizes, profiles and alignment of components.

C. Fabricate and assemble this work with proper and acceptable provision for noiseless thermal movements, fabrication and erection tolerances, adjoining building component tolerances and dynamic movements.

D. Removable members such as glass stops, fillers or closures shall be extruded, and securely engaged into adjacent components. Fabricate extrusions to eliminate edge projection, bowing, or misalignment at joints.

E. Design and construct moving joints so that they will be, and remain, permanently watertight, and will accommodate weather and building dynamics.

F. For surfaces exposed to view employ only materials which are free from alloy defects, die marks, scratches, streaks and other surface blemishes.

G. Complete the fabrication and assembly of the components in the shop to the greatest extent possible to minimize field cutting, splicing, fastening, sealing and finishing.

1. Maintain provisions for anticipated movement.
2. Disassemble only as necessary for shipment and erection.
3. Provide secure attachment and support at joints, with hairline, flush fit between contacting members.

H. Complete the cutting, fitting, forming, drilling and grinding of metal before cleaning and applying specified finish. Remove arrises from cut edges and ease edges and corners to a radius of approximately 1/64-inch minimum, 1/32-inch maximum.

I. Welding:

1. Comply with industry standards for assembly and fabrication using system and rods for exposed metals that will provide texture match with materials being joined.
2. Grind exposed welds smooth and flush with parent metal using clean grinding wheels of a type that will not result in stains or discoloration.

J. Finishing: Finish surfaces as follows to be within the color range represented by approved Samples.

1. Finish aluminum surfaces exposed to view as specified in Section 05080.
2. Prime concealed aluminum surfaces in contact with masonry, concrete or steel with a compatible primer or bituminous paint.
3. Paint steel parts of anchors, anchor inserts, reinforcement and supports with primer specified. After field welding, remove weld slag and touchup primed surface with same primer.
4. Provide minimum DFT of 2 mils for primer and 30 mils for bituminous paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that opening is within allowable tolerances, level, clean, will provide a solid anchoring surface.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. General:

1. Do not install defective components including warped, bowed, dented, abraded and broken members. Remove and replace members that have been damaged during installation or thereafter before the time of final acceptance.
2. Do not cut, trim, or weld components during erection, in any manner that would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance of the work.
3. Return components that require alteration to the shop for refabrication, if possible, or for replacement by new parts.
4. Install components level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
5. Protect unpainted aluminum surfaces that will be in contact with cementitious and dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

B. Assembly and anchorage:

1. Anchor components securely in place by bolting, welding or other permanent mechanical attachment system, which will comply with performance requirements and permit movements intended or necessary.
2. Install slip-joint linings where required to ensure movement as intended or necessary.
3. Remove weld slag and apply primer over welds as specified above.

C. Erection tolerances:

1. Provide adjustment within the assembly to accommodate job variations.
2. Install the work of this Section within the following tolerances.
3. Variation from plane: Limit variation from plane or location shown to 1/8-inch in 10 feet; 1/4-inch over total length.

    a. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3-inches, limit offset from true alignment to less than 1/32-inch; otherwise, limit offset from true alignment to 1/8-inch.
    b. Maximum offset between glass framing members at corners of glazing pocket must not exceed 1/32-inch.

D. Glazing: Glaze skylight as specified in Section 08 80 00.

3.3 SEALANTS

A. Structural silicone sealant glazing:

1. Prepare surfaces that will contact sealant and install sealant according to sealant manufacturer's written instructions.
2. Preparation includes, but is not limited to, cleaning and priming.
3. Mechanically fasten glazing in place until sealant cures.
4. Clean excess sealant from surfaces before sealant cures.

B. Seal joints between skylight and adjacent construction to be weathertight.
C. Comply with the requirements of Section 07 92 00.

3.4 FIELD QUALITY CONTROL

A. Tests:

1. Perform field water test in compliance with ASTM E 1105, on the completed skylight. Should such testing result in leakage, eliminate the causes of such leakage at no additional cost to the Owner.
2. Remedial measures must maintain standards of quality and durability and are subject to the Architect's approval.
3. Provide powered scaffold, hose and sufficient personnel to operate scaffold and hose.
4. Perform one test on each skylight assembly after completion, with repeat tests if failures occur.

B. Touchup: Touchup damaged finish as specified in Section 05 08 00, when the results are satisfactory to the Architect, otherwise return the damaged component to the shop for refinishing.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door hardware, including electric hardware.
2. Storefront and entrance door hardware.
3. Gate Hardware.
4. Third-party inspection report for fire-rated door assemblies.
5. Battery-powered electronic credential access control locks and panic hardware lever trim.
6. Impact system frame/door/hardware assembly.
7. Card Access control system.
8. Hand-key biometric access control devices.
9. Hold-open closers with fire-alarm interface.
10. Wall or floor-mounted electromagnetic hold-open devices.
11. Power supplies for electric hardware.
12. Low energy door operators plus sensors and actuators.
13. Remote button release hardware.
14. Door position switches.
15. Cabinet locks.
16. Padlocks.
17. Cylinders for doors fabricated with locking hardware.
18. Stainless steel guard rails between pairs of exterior doors.
19. Point-to-point wiring diagrams for electric hardware.
20. Key cabinets.
21. Key management software.

B. Related Divisions:

22. Division 06 – door hardware installation
23. Division 07 – sealant at exterior thresholds
24. Division 08 – metal doors and frames, interior aluminum frames, wood doors, integrated security systems, specialty doors, storefront and glazed curtainwall systems.
25. Division 10 – operable partitions
26. Division 21 – fire and life safety systems
27. Division 28 – security access systems

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

28. Windows.
29. Cabinets, including open wall shelving and locks.
30. Signs, except where scheduled.
31. Toilet accessories, including grab bars.
32. Installation.
33. Rough hardware.
34. Conduit, junction boxes & wiring.
35. Sliding aluminum doors, except cylinders where detailed.
36. Access doors and panels, except cylinders where detailed.
37. Corner Guards.
38. Welded steel gates and supports.

1.2 REFERENCES

A. Use date of standard in effect as of Bid date.

1. American National Standards Institute
    a. ANSI 156.18 – Materials and Finishes.
    b. ICC/ANSI A117.1 - 2009 – Specifications for making buildings and facilities usable by physically handicapped people. [omit for CA work – not applicable]
2. BHMA – Builders Hardware Manufacturers Association
3. 2019 California Building Code
    a. Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing
4. DHI – Door and Hardware Institute
5. NFPA – National Fire Protection Association
    a. NFPA 80 2016 Edition – Standard for Fire Doors and Other Opening Protectives.
    b. NFPA 105 – Smoke and Draft Control Door Assemblies
    c. NFPA 252 – Fire Tests of Door Assemblies
6. UL – Underwriters Laboratories
    a. UL10C – Positive Pressure Fire Tests of Door Assemblies.
    b. UL 305 – Panic Hardware
7. WHI – Warnock Hersey Incorporated State of California Building Code
8. Local applicable codes
9. SDI – Steel Door Institute
10. WI – Woodwork Institute
11. AWI – Architectural Woodwork Institute
12. NAAMM – National Association of Architectural Metal Manufacturers
13. 2010 Americans with Disabilities Act Standards for Accessible Design (2004 ADAAG).

B. Abbreviations

1. Manufacturers**:** see table at 2.1.A of this section
2. Finishes**:** see 2.7 of this section.

1.3 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS**:** Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information**:**

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.

11. Point-to-point wiring diagrams.
12. Manufacturer's technical data and installation instructions for electronic hardware.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
C. Deviations**:** Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.
D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.
G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE

A. Qualifications**:**

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a. Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware**:** Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
C. Exit Doors**:** Operable from inside with single motion without the use of a key or special knowledge or effort.
D. Fire-Rated Openings**:** NFPA 80 compliant. Hardware UL10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.
F. Pre-Installation Meetings**:** Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery**:** coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores**:** secured delivery direct to Owner's representative.

B. Acceptance at Site**:** Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage**:** Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.
B. Coordination**:** Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information**:**

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
5. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
6. Coordinate: low-voltage power supply locations.
7. Coordinate: back-up power for doors with automatic operators.
8. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.
9. Manufacturers' templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
D. Environmental considerations**:** segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.
B. Include factory order numbers with close-out documents to validate warranty information, required for Owner in making future warranty claims:
C. Minimum warranties:

1.	Locksets:	Three years
2.	Extra Heavy Duty Cylindrical Lock:	Seven Years
3.	Exit Devices:	Three years mechanical One year electrical
4.	Closers:	Thirty years mechanical Two years electrical
5.	Hinges:	One year
6.	Other Hardware:	Two years

1.8 COMMISSIONING**:**

A. Conduct these tests prior to request for certificate of substantial completion**:**

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.9 REGULATORY REQUIREMENTS**:** (DELETE THIS ARTICLE IN ENTIRETY FOR PROJECTS NOT UNDER DSA'S *OR OSHPD'S* AUSPICES)(CODE CITATIONS ARE CBC 2019)

A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per 2019 California Building Code, Section 11B-404.2.7.

1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.

B. Handles, pull, latches, locks, other operable parts**:**

1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2019 California Building Code Section 11B-309.4.
2. Force required to activate the operable parts: 5.0 pounds maximum, per 2019 California Building Code Section 11B-309.4.

C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2019 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

D. Low-energy powered doors: comply with ANSI/BHMA A156.19. Reference: 2019 California Building Code Section 11B-404.2.9.

1. Where powered door serves an occupancy of 100 or more, provide back-up battery power or stand-by generator power, capable of supporting a minimum of 100 cycles.
2. Actuators, vertical bar type: minimum 2-inches wide, 30-inches high, bottom located minimum 5-inches above floor or ground, top located minimum 35-inches above floor or ground. Displays International Symbol of Accessibility, per 2019 California Building Code Section 11B-703.7.
3. Actuators, plate type: use two at each side of the opening. Minimum 4-inches diameter or 4-inches square. Displays International Symbol of Accessibility, per 2019 California Building Code Section 11B-703.7. Locate centerline of lower plate between 7- and 8-inches above floor or ground, and upper plate between 30- and 44-inches above floor or ground.
4. Actuator location: conspicuously located, clear and level floor/ground space for forward or parallel approach.

E. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2019 California Building Code Section 11B-404.2.8.

1. Spring hinges: adjust for 1.5 seconds minimum for 70 degrees to fully closed.

F. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2019 California Building Code Section 11B-404.2.10.

1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.
2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.

G. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2019 California Building Code Section 11B-404.2.3.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.
2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2019 California Building Code 11B-307.4.

H. Thresholds**:** floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2019 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches**:** beveled to slope no greater than 1**:**2 (50 percent slope). 2019 California Building Code Section 11B-303.2 & ~.3.

I. Floor stops**:** Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

J. Pairs of doors with independently activated hardware both leafs**:** limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2019 California Building Code Section 11B-703.4.2.

K. Door and door hardware encroachment**:** when door is swung fully-open into means-of-egress path, the door may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2019 California Building Code, Section 1005.7.1.

1. In I-2 occupancies, surface mounted latch release hardware, mounted to the side of the door facing away from the adjacent wall where the door is in the open position, is not exempt from the inclusion in the 7-inch maximum encroachment, regardless of its mounting height, per 2019 California Building Code, Section 1005.7.1 at Exception 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Listed acceptable alternate manufacturers: these will be considered; submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE ALTERNATE:
Hinges	(IVE) Ives	Owner standard
Continuous Hinges	(IVE) Ives	Owner Standard
Key System	(MED) Medeco	Owner standard
Mechanical Locks	(SCH) Schlage	Owner standard
Electronic Locks	(SCE) Schlage Electronics	Owner standard
Exit Devices	(VON) Von Duprin	Owner standard
Closers	(LCN) LCN	Owner standard
Auto Flush Bolts	(IVE) Ives	Owner Standard
Coordinators	(IVE) Ives	Owner Standard
Silencers	(IVE) Ives	Rockwood, Trimco
Kickplates	(IVE) Ives	Rockwood, Trimco
Stops & Holders	(IVE) Ives	Owner Standard
Overhead Stops	(GLY) Glynn-Johnson	ABH
Thresholds	(ZER) Zero	NGP, Pemko
Seals & Bottoms	(ZER) Zero	NGP, Pemko

2.2 HINGING METHODS

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless-steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

D. Continuous Hinges:

1. Geared-type aluminum.

a. Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.
b. If units are used at storefront openings, color-coordinate hinge finish with storefront color. Custom anodizing and custom powdercoat finishes subject to Architect approval.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS

A. Mortise Locksets and Latchsets**:** as scheduled.

1. Chassis**:** cold-rolled steel, handing field-changeable without disassembly.
2. Universal lock case – 10 functions in one case.
3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
4. Latchbolts**:** 0.75 inch throw stainless steel anti-friction type.
5. Lever Trim**:** through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
    a. Spindles**:** security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
    b. Inside lever applied by screwless shank mounting – no exposed trim mount screws.
    c. Levers rotate up or down for ease of use.
    d. Vandalgard locks**:** locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.
6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
7. Turnpieces**:** accessible offset turn-lever design not requiring pinching or twisting motions to operate.
8. Deadbolts**:** stainless steel 1-inch throw.
9. Electric operation**:** Manufacturer-installed continuous duty solenoid.
10. Strikes**:** 16 gage curved steel, bronze or brass with 1-inch-deep box construction, lips of sufficient length to clear trim and protect clothing.
11. Scheduled Lock Series and Design**:** Schlage L series, 06A design.
12. Certifications**:**
    a. ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
    b. ANSI/ASTM F476-84 Grade 31 UL Listed.
13. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2019 11B-404.2.7 and 11B-309.4.

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features**:**

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. Deadlocking latchbolts, 0.75-inch projection.
4. End caps**:** impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.

6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.
8. Exterior doors scheduled with XP-series devices**:** Static load force resistance of at least 2000 pounds.
9. Accessibility: Require not more than 5 lb to retract the latchbolt, per CBC 2019 11B-404.2.7 and 11B-309.4.

    a. Mechanical method: Von Duprin “AX-“ feature, where touchpad directly retracts the latchbolt with 5 lb or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb requirement.

B. Specific features**:**

1. Non-Fire Rated Devices**:** cylinder dogging.
2. Lever Trim**:** breakaway type, forged brass or bronze escutcheon min. 0.130-inch thickness, compression spring drive, match lockset lever design.
3. Rod and latch guards with sloped full width kickplates for doors fitted with surface vertical rod devices with bottom latches.
4. Fire-Labeled Devices**:** UL label indicating “Fire Exit Hardware”. Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
5. Inpact recessed devices**:** 1.25-inch projection when push-pad is depressed. Sloped metal end caps to deflect carts, etc. No pinch points to catch skin between touchbar and door.
6. Delayed Egress Devices**:** Function achieved within single exit device component, including latch, delayed locking device, request-to-exit switch, nuisance alarm, remote alarm, key switch, indicator lamp, relay, internal horn, door position input, external inhibit input plus fire alarm input. NFPA 101 “Special Locking Arrangement” compliant.
7. Electrically Operated Devices**:** Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
8. Removable Mullions**:** Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

2.5 CLOSERS

A. Surface Closers**:**

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2019 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

    a. Exception: exterior doors’ pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers**:** tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors**:** seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

B. Electro-hydraulic Automatic Operators

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check valve, sweep valve, latch valve to control door.
6. Provide drop plates, brackets, or adapters for arms as required for details.
7. Provide hard-wired actuator switches for operation as specified.
8. Provide weather-resistant actuators at exterior applications.
9. Provide key switches with LED’s, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to “KEYING” article, herein.
10. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
11. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices
12. Actuators: as scheduled
    a. Coordinate mounting heights with plans.
    b. Vertical bar type: minimum 2 inches wide by 30 inches in height. Locate bar with bottom 5 inches maximum above finish floor, and top 35 inches minimum above finish floor.
    c. Actuators of either type: display International Symbol of Accessibility (ISA) pictogram.
13. Safety sensors**:** as scheduled.

2.6 OTHER HARDWARE

A. Automatic Flush Bolts**:** Low operating force design.
B. Overhead Stops**:** Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
C. Kick Plates**:** Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

E. Seals: Four-fingered type at head & jambs. Inelastic, rigid back, not subject to stretching. Self-compensating for warp, thermal bow, door settling, and out-of-plumb. Adhesive warranted for life of installation.

a. Proposed substitutions: submit for approval.
b. Three-fingered type at hinge jambs of doors fitted with continuous hinges where jamb leaf of hinge is fastened to the frame reveal.

F. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.

1. Include automatic type door bottoms, as opposed to fixed sweeps, at stairs and elevator lobbies to allow fine-tuning of pressurization systems.

G. Thresholds: As scheduled and per details. Comply with CBC 2019 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Saddle thresholds: 0.125 inches minimum thickness.
2. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25-inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL".
3. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, include a 0.25in high 5in wide saddle in the bid, and request direction from Architect.
4. Fire-rated openings, 3-hour duration: Thresholds, where scheduled, to extend full jamb depth.
5. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
6. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
7. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

H. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

1. Exception: surface-mounted overhead stops, holders, and friction stays.

I. Silencers**:** Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent**:** door bears against silencers, seals make minimal contact with minimal compression – only enough to effect a seal.
J. Key Control Software**:** Same manufacturer as key cylinders, supply to Owner.
K. Wall- & Floor-mounted electromagnetic door holders**:** LCN's SEM series or approved equivalent. Incorporate into U.L. listed fire & life-safety system, doors release to allow closure and latching when door's zone is in alarm state. Use minimum projection required to allow door to open as widely as allowed by wall conditions and projection of door hardware.

2.7 FINISH**:**

A. Generally**:** BHMA 626 Satin Chromium.

1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.

B. Door closers**:** factory powder coated to match other hardware, unless otherwise noted.

2.8 KEYING REQUIREMENTS

A. Key System**:** existing Medeco system. Initiate and conduct meeting(s) with Owner to determine system structure, furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Furnish temporary construction-keyed and permanent cylinders. Contractor to demonstrate to the Owner that temporary keys no longer operate the locking cylinders at the end of the project.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.
2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1010.1.9.2 and
3. 11B-404.2.7.
4. Locate panic hardware between 36 inches to 44 inches above the finished floor.
5. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops**:** before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets**:** install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.4 ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods**:** repair or replace to Owner's satisfaction.
2. Adjust doors to fully latch with no more than 1 pound of pressure.

    a. Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.

3. Adjust delayed-action closers on fire-rated doors to fully close from fully opened position in no more than 10 seconds.
4. Adjust door closers per 1.9 this section.

B. Fire-rated doors**:**

1. Wood doors**:** adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.
2. Steel doors**:** adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.
3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.

C. Final inspection**:** Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following**:**

1. Has re-adjusted hardware.
2. Has evaluated maintenance procedures and recommend changes or additions, and instructed Owner's personnel.
3. Has identified items that have deteriorated or failed.
4. Has submitted written report identifying problems.

3.5 DEMONSTRATION

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. To be determined

END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glazing for the Project except as noted below.
2. Glazing accessories.
3. Glazing sealants.

B. Related requirements:

1. Division 07 for sealants other than required for the work of this Section.
2. Division 08 for lazed assemblies.
3. Division 10 for framed mirrors and for glazing in fire extinguisher cabinets.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for glass, sealants, gaskets and glazing accessories.
B. Samples:

1. Twelve-inch square labeled Samples of each type and color of glass, with taped or ground edges.
2. Coated glass Samples shall show extremes of color range.
3. Glass indicated or required to be “heat-treated” need not be when submitting Samples.

C. Certification: Glass manufacturer’s certification as specified.

1. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements. Include wind pressure analysis, thermal stress analysis, including shading effects, and review of Shop Drawings stating that details are suitable for proposed glass products.
2. Separate certifications are not required for glazing materials bearing the manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

D. Glazing schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass type and thickness for each size opening and location.
E. Preconstruction adhesion and compatibility test report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
F. Product test reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:

1. Coated float glass.
2. Insulating glass.
3. Glazing sealants.

4. Glazing gaskets.

G. Labels: Provide NFRC Rating Labels as required by the California Energy Code.

1.3 QUALITY ASSURANCE

A. Glazier qualifications: 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; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
B. Fabricator qualifications: When the glass manufacturer has a certification program, the fabricator shall have a current “Certified Fabricator” certificate form the glass manufacturer.
C. Source limitations for clear glass: Obtain clear float glass from one primary glass manufacturer.
D. Source limitations for coated glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.
E. Source limitations for insulating glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
F. Source limitations for acoustical laminated glass: Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
G. Source limitations for glazing accessories: Obtain glazing accessories from one source for each product and installation method indicated.
H. Fire-rated door assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
I. Fire-protection-rated glazing labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450-degree F, and the fire-resistance rating in minutes.
J. Safety glass:

1. Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
2. Subject to compliance with the above, provide a permanent mark on safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to AHJ.

K. 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 inspecting and testing agency.

1. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.
3. National Accreditation and Management Institute.

L. Mockups: Before glazing, build mockups for each glass product indicated below in accordance with the following requirements, using materials indicated for the completed Work.

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:

a. Heat-strengthened coated glass.
b. Tempered glass.
c. Laminated glass.
d. Coated insulating glass.

3. Obtain Architect's approval of mockups before starting fabrication.
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Demolish and remove mockups when directed.
6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

M. Manufacturer certification: Submit manufacturer certification that.

1. All materials to be used in the glazing system such as sealants, setting blocks, spacers, backing rods, metal finishes, etc. have been reviewed by the glass manufacturer.
2. These materials are compatible with the glass supplied to the Project site.
3. These materials will not cause deterioration, premature aging, and staining of adjacent materials.

N. Labeling:

1. Submit a certificate stating that the glass furnished for the Project complies with the Specifications.
2. Label each piece of heat-treated glass with a permanent logo etched in one corner to identify the fabricator.

1.4 HANDLING

A. Storage: Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, run-off, and other causes.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of bulk sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.

1.6 SPECIAL WARRANTIES

A. Warrant laminated glass for 5 years after Substantial Completion against delamination, deterioration of plastic sheet or laminating film, loss of transparency, color change or other forms of deterioration due to defective materials or lamination.
B. Warrant insulating glass for 5 years after Substantial Completion against fogging and loss of transparency due to defective materials or sealant failure.
C. Replace defective materials and workmanship during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 PRIMARY GLASS MANUFACTURERS

A. Basis of design: Vitro Architectural Glass (formerly PPG Glass.)
B. AGC Flat Glass North America Ltd.
C. Guardian Glass.
D. Viracon.
E. Or equal.

2.2 CRITERIA AND PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
B. Glass design: Glass thicknesses shown and heat treatment specified are minimum requirements based upon manufacturer's regularly published literature. The Architect makes no representations as to the accuracy of the literature or the conclusions derived therefrom.. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thickness and in strengths (annealed or heat-treated) required to meet or exceed the criteria specified below and ASTM E 1300.
C. Delegated design: Glass thickness and temper indicated have not been engineered. Design glass, including comprehensive engineering analysis according to the CBC by a qualified professional engineer under the Contractor’s employ, using the following design criteria.

1. Design wind pressures:
    a. Positive: As indicated on Drawings. If not indicated, comply with ASCE/SEI “Minimum Design Loads for Buildings and Other Structures,” unless otherwise prescribed by Code.
    b. Negative: 20 psf, unless otherwise indicated.

2. Vertical glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
3. Sloped glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads.
    a. Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.

4. Probability of breakage for glass surfaces sloped less than 15 degrees from vertical: Design glass for a probability of breakage not greater than 0.008.
5. Probability of breakage for glass surfaces sloped more than 15 degrees from vertical: Design glass for a probability of breakage not greater than 0.001.
6. Maximum lateral deflection: For glass supported on all 4 edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or one-inch, whichever is less.
7. Differential shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Thermal movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature change: 120 deg F, ambient; 180 deg F, material surfaces.

2. 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:

   a. For monolithic glass lites, properties are based on units with lites 6 mm thick.]For laminated glass lites, properties are based on products of construction indicated.
   c. For insulating glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch wide interspace.
   d. Center of glass U values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq.-foot by hour by -degree F.
   e. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
   f. Solar optical properties: NFRC 300.

2.3 GLASS MATERIALS

A. General:

1. Float glass: Shall comply with ASTM C 1036; heat-treated glass shall comply with ASTM A 1048.
2. ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass.
3. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
4. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications Method of Test.
5. US Consumer Product Safety Commission CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials
6. Provide glass free from bubbles, smoke vanes, air holes, scratches and other defects.
7. Laminated glass shall comply with ASTM C 1172. Glass in the lamination shall be from the same manufacturer when heat-strengthened.
8. Fabricate tempered glass by horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
9. Comply with Code and the Drawings for glass in hazardous locations. Laminated glass subject to human impact shall comply with CPSC 16 CFR Part 1201.
10. Unless otherwise indicated or specified, overall thickness of each glass type and composite thickness of multiple layer glass types shall be consistent throughout the Project.
11. Provide insulating glass assemblies CBA rated by IGCC when tested in compliance with ASTM E 774, and permanently labeled with the appropriate certification label of IGCC, ALI or NCTL.

B. Glass types: To be determined.

2.4 GLAZING MATERIALS

A. Laminating glass interlayer:

1. Clear “SentryGlas” by Kuraray America.

   a. Thickness: 0.035 inch 0.060 inch 0.090 inch 0.100 inch.
   b. Young’s Modulus: 43 kpsi, ASTM D 5026.
   c. Tensile strength: 5.0 kpsi, ASTM D 638.
   d. Elongation: 400 percent, ASTM D 638.
   e. Flex modulus: 50 kpsi, ASTM D 790.

f. Heat deflection temperature at 0.46 MPa: 110 degrees F., ASTM D 648.

B. Setting block: Neoprene or, in the case of structural silicone glazing, dense extruded silicone; both with a hardness of 80 to 90 durometer Shore A with a minimum length of 4-inch or as required by GANA guidelines. For flush glazed skylights, provide L shaped setting blocks.
C. Side blocks: Neoprene or dense silicone with a hardness of 65 ±5 durometer Shore A.
D. Spacer: Neoprene, silicone, or EPDM, 50 to 60 durometer hardness, compatible with sealants used.
E. Sealants:

1. For structural glazing: High modulus (structural) silicone sealant, 2-component, non acidic, neutral curing silicone which meets or exceeds Federal Specification TT-S-00227, Type II, Class B and ASTM C920, Type M, NS, Class 12.5.

a. Color: Black.
b. Acceptable products:

1) Dowsil “995” or “DC 995.” DC 983 is not acceptable for use with painted substrate without incorporation of special substrate preparation requirements utilizing Scotch Brite pads, alcohol and barrier primer.
2) Dowsil “999” (Glass Mullion Glazing System only).
3) General Electric “Ultra Glaze SSG 4400” and “Ultra Glaze 4000.”
4) Tremco “Proglaze SSG.”
5) Pecora “895” or 2-part “Fast Cure.”

c. Painted surfaces in contact with structural silicone must be primed with a primer approved for use by the sealant manufacturer.

2. For primary seal of insulating units: Manufacturer standard sealant.
3. For all other conditions: Medium and low modulus (weatherseal) silicone sealant, one-part, non acidic, neutral curing, Type S, Grade NS, Class 25, Use NT, capable of withstanding movements from plus 50 to minus 50 for medium modulus and plus 100 to minus 50 percent for low modulus based on original joint design.

a. Color: Match Architect’s paint color for sealant.
b. Acceptable products:

1) Dowsil “795” and “790.”
2) General Electric “Silpruf,” “Silpruf LM.”

c. Only low modulus sealant, such as Dowsil “790” or GE “Silpruf LM,” shall be used when sealing to cementitious substrate.

F. Glazing gasket: Resilient, continuous neoprene, (except as specified below) extrusions, 40 to 60 Shore A durometer hardness, meeting the requirements of ASTM C 509 for cellular (closed-cell) material, and AAMA SG-1 for non-cellular (dense) material, with molded corners.

1. Gaskets shall have a continuous mechanical engagement to framing members and factory molded corners.
2. Gasket corners, whether molded or not, shall be bedded in elastomeric sealant compatible with glazing gaskets.
3. When in direct contact with silicone sealants, gaskets, spacers and setting blocks shall be heat cured silicone rubber based material chemically compatible with the silicone sealant and with sufficient hardness for the specific purpose intended. Compatibility testing by the silicone sealant supplier/manufacturer shall be required.

4. Design interior and exterior gasket profiles to produce a glass edge pressure of 12 psf unless otherwise recommended by the glass manufacturer.

G. Compressible filler rod:

1. Closed-cell or waterproof jacketed rod stock of synthetic rubber or plastic foam compatible with sealants used, flexible and resilient, with 5 to 10 psi compressive strength at 25 percent deflection.
2. Do not use vinyl foam stock.

2.5 FABRICATION

A. Cutting:

1. Obtain sizes from Shop Drawings or by field measurement. Cut glass to fit each opening with at least the minimum edge clearance and bite on glass recommended by glass manufacturer.
2. When glass will be precut to sizes obtained from Shop Drawings, take field measurements of each opening before glazing to verify adequate bite on glass and minimum edge clearance.
3. Glaze openings, which do not fall within tolerances for which precut glass has been sized only with glass specially cut to fit such openings.
4. Do not nip glass edges. Edges may be wheel cut or sawed and seamed at manufacturer's option.

B. Edge quality of annealed and heat-strengthened glass:

1. Shark teeth shall not penetrate more than half of glass thickness.
2. Serration hackle shall not penetrate more than 10 percent of glass thickness.
3. Flare shall not exceed 0.062-inch as measured perpendicular to glass surface edge.
4. Bevel shall not exceed 0.062-inch.
5. Flake chip depth shall not exceed 0.031-inch and length or diameter shall not exceed 0.25-inch.
6. Rough chips are not permitted. Rough chips are those that exceed dimensional limits for flake chips.
7. For glass to be cut at site, provide glass 2-inch larger than required, in both dimensions, to facilitate cutting of clean-cut edges without seaming or nipping.
8. Do not cut, seam, nip, or abrade tempered and heat strengthened glass after tempering.
9. Provide flat ground edges with arised corners where glass edge is not covered by a metal stop.

C. When full height vision glass is shown (without intermediate horizontals or rails), safety glazing is only required on the inboard lite for Code compliance except on the ground floor or other areas where there is a walking surface on both sides. Alternately, if an aluminum rail is used on the interior of the framing, neither lite need not be safety glazing.

D. Laminated glass:

1. Factory-laminate using manufacturer standard heat-plus-pressure process.
2. Exercise caution to exclude dirt and other foreign materials from lamination and to eliminate all voids.
3. Arrange each layer of laminate in the order indicated, and label exterior (or interior) face of each completed unit so that there will be no error in the placement during installation.
4. Conceal processed and coated glass in the lamination.

5. Factory-cut units to proper size; do no cutting at Project site.

E. Insulating glass:

1. Provide black aluminum spacers with bent (not mitered or spliced) corners; only one seam is allowed in each spacer of each unit.
2. The date of the manufacture of the unit shall be discretely identified on the spacer (top of unit, left or right corner).

F. Identification: Identify tempered glass with a manufacturer-installed, removable paper designation as required by CBC section 2406.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Verify that openings and frames to be glazed are within allowable tolerances, plumb, level and square.
C. Inspect framing joint intersections to insure that the offset in the joinery will not impose undue edge pressure on the glass in compliance with GANA, Glazing Manual, and Sealant Manual, guidelines.
D. Correct other detrimental conditions before proceeding with glazing.

3.2 STANDARDS AND PERFORMANCE

A. Watertight and airtight installation is required for each piece of glass installed in an exterior wall and skylight.
B. Each installation must withstand normal temperature changes, wind loading, and impact from normal operation for doors and windows, without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the Work.
C. Installed glass shall be free from rattle.
D. Protect glass from damage at all times during handling, installation and operation of the building until Substantial Completion.
E. Comply with combined recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are specified.
F. Except as recommended otherwise by the manufacturers of the glass and glazing materials, comply with GANA Glazing Manual and the following:

1. Provide minimum nominal glass bite of 0.375-inch on monolithic lites; 1/2-inch on insulated glass units.
2. Where joint movement will result in variable glass bite, increase nominal bit to provide 0.375-inch minimum bite and 0.25-inch minimum edge clearance.

G. Inspect each piece of glass immediately before installation and eliminate those with edge damage or face imperfections.
H. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.

3.3 PREPARATION FOR GLAZING

A. Immediately before glazing, clean the glazing channel and other framing members to receive glass.

1. Remove coatings not firmly bonded to the substrate.
2. Verify that framing is satisfactory to receive the glass.

B. Apply primer or sealer to joint surfaces when recommended by sealant manufacturer.

3.4 GLASS INSTALLATION

A. Structural glazing: Comply with the sealant manufacturer’s instructions and the following ASTM standards.

1. C 794: Sealant compatibility and adhesion to each substrate to be encountered on the Project.
2. C 1087: Sealant compatibility with backing.
3. C 1087: Sealant compatibility and lack of adhesion to bond breaker.
4. C 1184: Structural Glazing Specifications.
5. C 1401: Guide for Structural Glazing.

B. Erect each pane of glass square, plumb, and with uniform clearances between panel and rebates.
C. Follow glass manufacturer’s instructions and GANA Standards. Maintain minimum bed clearance between glass and frame.
D. Do not nip glass. Do not install glass with edge damage.
E. Install glass with required glass markings right side up so they can be read from the exterior.
F. Setting blocks:

1. Minimum length of 4 inches or as required by GANA guidelines; minimum width shall correspond to the glass thickness and retaining member but, in no case less than the glass thickness at point of contact.
2. Locate at quarter points, or in accordance with GANA glazing guidelines.
3. Secure against migration.
4. Shims used in conjunction with setting blocks must be of the same material, hardness, length and width as the setting blocks.

G. Side blocks:

1. Locate side blocks where required within the upper half of each jamb for each light.
2. Install block with 1/8-inch clearance between block and glass bearing surface.
3. Block shall be sufficient length to prevent point loading on the glass.
4. Side blocks are not required where an individual glass light is continuously sealed with silicone at 2 or more edges, when the sealant is installed immediately following the setting of the glass.

H. Provide spacers inside and out unless continuous gaskets are used. Use glass manufacturer recommended size and spacing.
I. Prevent exudation of sealant or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels, except as needed for drainage and weep holes) depending on light size, thickness and type of glass, and complying with manufacturer's recommendations.
J. Sealant shall not be adhered to, or placed against, the edge of a laminated glass unit interlayer.

K. Force sealants into channel to eliminate voids and to assure complete "wetting" or bond of sealant to glass and channel surfaces.
L. Tool exposed surfaces of sealants to provide a substantial "wash away" from the glass.
M. Install pressurized gaskets to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.
N. Clean and trim excess glazing materials from the glass, stops and frames promptly after installation, and eliminate stains and discolorations.
O. Where wedge shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subjected to dynamic movement.

1. Anchor gasket to stop with matching ribs, or with adhesive.

P. Clean, prime and mask structural silicone joints the same day when silicone is applied.

3.5 CURING/PROTECTING/CLEANING

A. Cure glazing sealants and compounds in compliance with their manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
B. Protect glass from breakage immediately upon installation. Do not apply markers of any type to glass.
C. Before Substantial Completion, remove and replace glass that is broken, chipped, cracked, abraded, stained or damaged in other way, including natural causes, accidents and vandalism.
D. Maintain glass in a clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other work.
E. Remove remaining labels and wash and polish glass on both faces not more than 4 days prior to Owner's acceptance of the work in each area. Comply with GANA 01-0300 and the glass manufacturer's recommendations.

3.6 GLASS SCHEDULE

A. See Finish Schedule on Drawings.

END OF SECTION

DIVISION 09
FINISHES

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SECTION 09 05 16 - CONCRETE SLAB PREPARATION FOR FINISH FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Preparation of interior concrete slabs to receive finish flooring, including the following concrete slab tests:

1. Relative humidity test (RH.)
2. Concrete slab moisture vapor emission rate test (MVER.)
3. Alkalinity test.

B. Related requirements:

1. Division 03 for concrete topping.
2. Additional concrete testing and surface preparation requirements applicable to the work of a particular floor covering are specified within the appropriate floor covering specification Section.

1.2 PRICE AND PAYMENT PROCEDURES

A. Unit prices: Furnish unit prices as dollars per square foot for surface preparation and application of the following:

1. Specified repair mortar to concrete slab areas that do not meet the floor covering manufacturer’s substrate requirements.
2. Specified vapor emission control systems (VECS) as a topical remediation for concrete slabs that do not meet the adhesive and floor covering manufacturers’ RH, MVER, or pH requirements.

B. Measurement procedures: Contract adjustments will be based on the net installed verifiable quantities of conforming work compared to quantities indicated on the Drawings.
C. Payment procedures: Payment will be based on actual quantities and measurements placed in the Work and verified by the Architect.
D. The Owner will not provide additional compensation for extraneous, non-conforming, and rejected work.

1.3 ABBREVIATIONS AND ACRONYMS

A. MVER: Moisture Vapor Emission Rate.
B. RH: Relative Humidity.
C. VECS: Vapor Emission Control System.

1.4 DEFINITIONS

A. Alkalinity: Measurement of hydrogen ion concentration that indicates the acidity (acid) or alkalinity (base) of a solution. Alkalinity is commonly referred to simply as “pH”.

B. Ambient Temperature: Prevailing temperature of the surrounding air that comes into contact with concrete slab surfaces, and with testing equipment and instruments under testing conditions. Ambient temperature is commonly referred to simply as “temperature”.
C. Moisture Vapor Emission Rate: Amount of moisture emitted from concrete slab surfaces, measured in theoretical pounds of water per 1,000 square feet of floor area for a 24-hour period. MEVR is commonly referred to as “pounds”, such as in “3 pounds”.
D. Concrete Slab: Cast-in-place and prefabricated concrete floor and deck assemblies, including cast underlayment, toppings, repair material, and similar items.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Specified VECS is excluded from the Contract, and used only when specified concrete slab testing results indicate RH, MVER, or pH levels exceed the selected adhesive or floor covering manufacturer’s recommended maximum limits.
2. Specified VECS becomes part of the Contract upon acceptance in writing by the Owner of a properly-executed Change Order.

B. Preinstallation Meeting: Schedule a preinstallation meeting between the Contractor, the Architect, the adhesive and flooring manufacturer’s field representatives, the flooring installers, and related trades to review slab testing, remediation, and flooring preparation and installation.

1. Meet before submittals required by this Section are prepared and submitted to the Architect, and at least 2 weeks before:

a. Ordering flooring materials.
b. Starting slab repair.
c. Starting floor covering surface preparation, installation, or application operations.

2. If more than one trade is responsible for slab testing, topical remediation, surface preparation, and flooring installation, those trades must also attend the meeting.
3. During the meeting, review the following:

C. Concrete slab design, concrete mix design, water-cement ratio, slab thickness at each test location, and below-grade slab vapor retarder products and placement.

1. Curing, sealing, or bond breaking compounds that were used on concrete slab surfaces, along with requirements and techniques used for removing compounds prior to testing and floor covering installation.

a. Adhesives selected for flooring installation.
b. Redistribution of moisture within the concrete slab after floor coverings are installed.
c. Testing procedures and sequence for each test, including sequence, frequency, and location of test sites.
d. Qualifications of the testing agency and testing agency personnel that will be conducting the tests and that will be interpreting test results.
e. Calibration and verification of test equipment prior to the start of each round of testing.
f. HVAC system operation and requirements during testing, including temperature and RH limits.
g. Preparation of testing sites and procedures to assure slab surfaces are free from material or substance that could hinder the free release of moisture from the slab.

h. Requirements for testing and inspection reports.
i. Construction schedule.
j. Temporary protection procedures required to be followed in order to provide protection of concrete surfaces from re-wetting after initial testing.
k. Identify conditions detrimental to proper surface preparation repair and testing.
l. Record significant meeting discussions, including those on corrective measures and actions that must be taken before starting work. No later than 48 hours after meetings, distribute digital (PDF) copies of the minutes of that meeting to those present, and to parties who should have been present.
m. Do not proceed with installation if disagreements resulting from meetings are not successfully resolved to the satisfaction of the disagreeing parties.

D. Sequencing: Conduct concrete surface tests only after the following occurs.

1. Building is enclosed with the building permanent exterior enclosure (weathertight).
2. “Wet work” such as other concrete work, plastering, and gypsum board finishing in the space is completed and has cured to a condition of equilibrium.
3. HVAC systems is activated, operating and has maintained temperature and RH at anticipated occupancy levels for a minimum of 48 hours prior to and during testing;
    a. If HVAC activation and operation prior to testing cannot be provided due to the construction schedule, close rooms or spaces where conditions can either be brought to anticipated normal conditions or into compliance with the minimum environmental parameters of the specified test standards.
    b. Provide a recording thermometer and hygrometer to monitor and record ambient temperature and RH levels for comparison to intended occupancy conditions.
4. Testing areas are properly prepared for testing. For those situations where drilling for RH probes may not be advisable (such as when floor heating elements/water tubing are used) provide meter accessories for wet concrete installation prior to placing concrete.

E. Scheduling:

1. When possible, allow a minimum of 90 days prior to testing in the construction schedule to permit concrete to cure and dry.
    a. If minimum concrete curing and drying time cannot be provided in the construction schedule, assume VECS must be incorporated in the Project as a topical remediation for concrete slab surfaces and include remediation in the Project cost unless otherwise directed by the Owner.
    b. Forced drying of the top surface of the concrete is not permitted.
2. Schedule testing so that it is complete and results submitted not less than one nor more than 3 weeks prior to installation or application of scheduled floor covering.
3. Allow sufficient time in the construction schedule to permit RH test sites to equalize for 72 hours prior to reading equilibrium relative humidity levels.

PART 2 - PRODUCTS

2.1 ON-SITE CONCRETE SLAB

A. Description: VECS applied to concrete slab surfaces as a topical remediation when test results indicate slab RH, MVER, or pH exceed selected adhesive or floor covering manufacturer's recommended limits.
B. Product: Design is based on formulations by one of the following, contingent on compliance with specified requirements, including item description.

1. Koster Waterproofing Systems (Basis of Design).
2. Floor Seal Technology, Inc.
3. Or equal.

C. Composition: Products may not contain compounds that have a potential to either re-emulsify or support micro-organism growth.
D. Performance Requirements:

1. Water Vapor Transmission: Control emission rates of 10 lbs. when tested in compliance with ASTM F 1869 to within compliance of flooring manufactures system.
2. Alkali Resistance: Tolerant to 14pH alkali exposure, when tested in compliance with ASTM D 1308 and ASTM F 710.
3. Adhesion Strength: Minimum range of between 370 and 500 psi, when tested in compliance with ASTM D 4541.
4. Adhesive Compatibility: Compatibility with primers, adhesives and flooring systems.
5. ASTM F 2170 Relative Humidity Tolerance: Tolerant to 90 percent RH exposure.

E. Environmental Requirements:

1. Growth Resistance: Product shall not support the growth of mold, mildew and biological growth.
2. Safety: Non-flammable, non-corrosive, non-toxic, and non-hazardous to installers.
3. Water Pollution: Non-marine pollutant, safe for natural water sources.
4. VOC Content: 99 g/l or less.

F. Surface Burning Characteristics: Materials shall comply with the following, as determined by testing of identical materials in compliance with ASTM E 84 performed by a qualified testing and inspecting agency or qualified national testing organization acceptable to the Owner.

1. Flame Spread Index (FSI) Value: Maximum FSI value of 0.
2. Smoke Developed Index (SDI) Value: Maximum SDI value of 0.
3. Combustion Characteristics: Materials shall not aid to combustion or add appreciable heat to ambient fire (shall be a non-combustible material), as determined by testing of identical materials in compliance with ASTM E 136.

2.2 ACCESSORIES

A. Provide accessories and secondary items supplied, required, recommended, approved, or accepted by the VECS manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify site conditions affecting the work of this Section.

B. Correct unsuitable conditions before proceeding with installation.

3.2 SLAB TESTING

A. Water Vapor Transmission Testing procedures for anhydrous calcium chloride test: ASTM F 1869.
B. Relative humidity probe test: ASTM F 2170 on slabs at the site.
C. Testing Procedures for Alkalinity: Conduct pH test per ASTM F 710. pH levels shall the limits acceptable to the flooring and adhesive manufacturers.
D. Adhesion Strength: ASTM D 4541.

3.3 SURFACE PREPARATION FOR FINISH FLOORING

A. Concrete Substrates: Prepare according to ASTM F 710 and the VECS manufacturer recommendations; when in conflict, comply with the most restrictive requirement.

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, in compliance with manufacturer-prepared instructions using manufacturer-recommended techniques and equipment. Do not use solvents.
3. 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.

3.4 REPAIR/RESTORATION

A. Repair damaged areas to match adjacent areas as approved by the Architect.
B. Remove and replace materials that are damaged, stained, that do not match adjacent materials or cannot be satisfactorily cleaned or repaired, as determined and directed by the Architect, at no cost to the Owner.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-structural metal framing (NSMF) as follows:

1. Interior steel studs and furring.
2. Shaftwall framing.
3. Horizontal steel suspension systems for support of lath/plaster and gypsum board assemblies.
4. Resilient sound clips.
5. Resilient channels.
6. Backing plates not provided by other trades for support of items attached to metal framing system.

B. Work installed but furnished in other Sections:

1. Access panels furnished by electrical and mechanical trades for access to their work.
2. Backing plates furnished with fixtures and equipment attached to, or supported by metal framing system.

C. Related requirements:

1. Division 09 for ceiling and soffit suspension systems.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-construction meeting: Prior to starting erection of the NSMF, but not later than one week prior to commencing work, arrange a preliminary meeting with trades associated with the work of this Section.

1. Presided over by Contractor, include subcontractor performing work of this Section, testing company representative, as appropriate, and a representative of the Fire Marshall.
2. Review locations of access panels, and fire extinguisher cabinets; the latter with a representative of the Fire Marshall.
3. Identify those locations on the slab. Use a removable marker where the slab is scheduled to remain exposed in the Work.
4. Review installation methods, procedures, time schedule and conditions under which work will proceed, including stud manufacturer's instructions and coordination required with related work.
5. Review and verify availability of materials and installer’s experience.
6. Record meeting minutes and distribute PDF copy to all concerned, including the Architect, within 48 hours of the meeting.

B. Coordination:

1. Notify concerned trades of items required to be incorporated into work of other Sections. Certain components specified under this Section includes items which are closely integrated with doors, glazing assemblies and work specified in other Sections that require close coordination with the work of this Section.
2. Be responsible for coordination required to ensure correct installation procedures and results.
3. Verify actual locations of embeds and existing adjacent structural supports by field measurements before erection and indicate measurements on Shop Drawings. Coordinate tolerances of other trades that may affect the work of this Section prior to start of Shop Drawings preparation.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data consisting of a complete list of materials together with brochures and descriptive data of all items proposed for use.
B. Load tables: Load tables and deflection table properly annotated for anticipated use for all studs prepared by a .
C. Shop Drawings: Large scale, dimensioned Shop Drawings of all assemblies showing the following.

1. Component details, framing layout, framed openings, anchorage to structure, seismic bracing, type, and location of fasteners and welds, and accessories required of related requirements.
2. Framing member size and gage designations, number, type, location, and spacing.
3. Indicate attachments, clips, strapping, bracing, splices, bridging, accessories, and details required for proper installation. Show and dimension all concealed backing plates required for wall-attached or wall-mounted items indicated; obtain dimensions from trades that will provide these items.
4. Indicate and identify all fasteners and welds (with AWS symbols).

D. Certificates:

1. Product Certifications: Code-compliant certification for each type of component used in these framing assemblies.
2. Mill certificates signed by framing member/accessory manufacturer certifying compliance with material requirements.
3. Welders' certificates.

E. Evaluation Reports: For firestop tracks post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

1. Limit deflection to L/600 where supporting stone, tile and other rigid materials subject to breakage.

B. Welding work qualifications:

1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements for AWS D1.3.
2. Use qualified welders experienced in welding light gage steel, and comply with AWS D1.1 and D1.3.
3. Verify that welders to be employed in this work have satisfactorily passed AWS qualification tests.
4. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5 HANDLING

A. Store materials under cover, off the ground or floor, in a dry, ventilated space.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General: One of the following systems of the size indicated and gage required to comply with criteria specified.

B. Shaftwalls:

1. ClarkDietrich Building Systems.
2. Marino\Ware.
3. USG J-runners, E and C-H studs.
4. Scafco Corp. Shaftwall Studs.

C. Elsewhere:

1. CEMCO.
2. ClarkDietrich Building Systems.
3. Marino\Ware.
4. Scafco Corp.

2.2 PERFORMANCE REQUIREMENTS

A. Fire resistance: Where a fire resistance classification is indicated, provide materials, accessories, and application procedures listed by UL, or tested according to ASTM E 119 for the type of construction shown, and acceptable to authorities having jurisdiction.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
C. Horizontal Deflection: For non-composite wall assemblies, limited to the followings:

1. At ground floor lobbies partitions opening to the outside: 1/360 at 15 psf.
2. At partitions to receive lath and plaster: 1/360 at 15 psf.
3. At partitions to receive stone cladding and tile: 1/600 at 15 psf.
4. Elsewhere: 1/360 at 5 psf.

2.3 STUDS, RUNNERS AND FURRING

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating:
    a. Interior Assemblies: ASTM A653/A653M, G40 (Z120).
    b. Exterior Perimeter Assemblies: ASTM A653/A653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645:

1. Shaftwalls: As specified above.
2. Elsewhere: Channel type cold-formed steel members with punched web, complying with the following, as applicable.
    a. Roll-formed from galvanized steel meeting ASTM A 653, Classification SQ, Grade 33; galvanized meeting G60 for 18-gage and lighter gage.
    b. For 16-gage and heavier, provide ASTM A 653, Classification SQ, Grade 50; galvanized meeting G60.
    c. Protective coating: ASTM A 653, G40 zinc coating.
    d. Bracing: Where the wall finish does not adequately brace both flanges of studs, add bracing or reduce allowable stresses in computing stud heights in compliance with Code.

C. Top and bottom runner, and bridging:

1. As recommended by the manufacturer of each stud type and of same gage as stud in same wall or partition, unless otherwise indicated on the Drawings. Provide unpunched, screwable tracks, gage to match studs, 1-1/2-inch flanges.
2. For shaftwalls: Where studs extend to the underside of floor or roof slabs, secure at top with “Fire Trak Cavity Shadowline” track by Fire Trak Corp. or other Code-compliant assemblies acceptable to the Architect.
3. For other fire-rated partitions: “MaxTrk” or “Blazeframe” both by ClarkDietrich Building Systems, “Fire Trak” by Fire Trak Corp., "Sliptrack Systems, Inc. "Slip-Trk" for fire-rated partitions, Fire Trak Corp. “VertiTrack VTD VTX” by the Steel Network, Runners by Blaze Frame, or other Code-compliant assemblies acceptable to the Architect.
4. Elsewhere: Use either “Slip Track 250” by ClarkDietrich Building Systems, or equal track matching (as a minimum) the stud gage in same wall but with a 2-1/2 inch leg, or a deep leg 54 mils thick (16-gage) minimum slip connection to accommodate slab deflection.

D. Joist framing:

1. Steel Joists: Manufacturer standard C-shaped steel joists, of web depths indicated, punched or unpunched, with stiffened flanges, and as follows.
    a. Minimum base-metal thickness: 20-gage minimum.
    b. Flange width: 1-5/8-inch, minimum.
2. Steel joist track: Manufacturer standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
    a. Minimum base-metal thickness: 20-gage minimum.
    b. Flange width: 1-5/8-inch, minimum.

E. Furring channels:

1. For gypsum board and soffit board:
    a. Zee furring channels: 30 mils thick (20-gage) model ZFN3 by Dietrich Industries, Inc. of depth to match insulation thickness, or equal.]
    b. All others (except resilient channels): 18 mils thick (25-gage) minimum, galvanized, hat-shaped.

2. For lath/plaster: 3/4-inch size as specified hereafter for runner channels.

F. Prefabricated headers: At the Contractor's option, ProX Header assemblies by ClarkDietrich Building System or CEMCO may be used in lieu of job-assembled headers.

G. Horizontal stiffener, runner channels and bridging: 54 mils thick (16-gage) channels fabricated of cold-rolled steel, ASTM A 366, with flanges not less than 7/16-inch wide. Minimum weights as follows:

Channel Size	Flange Width	Pounds/1000 linear foot
3/4-inch	7/16-inch	300
1-1/2-inch	7/16-inch	475
2-inch	19/32-inch	590

H. Resilient channels: RC-1 by USG, R/FC-1 by Dale Industries, Resilient Channels by Scafco, fabricated from steel sheet complying with ASTM A 924 or ASTM A 568.

I. Resilient sound clips: Super Soundproofing Co., "SSP Sound Isolation Clips" or Acoustical Surfaces, Inc. "Noise STOP clips RSIC-1."

2.4 FASTENERS AND ACCESSORIES

A. Screws:

1. ASTM C 1002 for metal framing 18 mils thick (25-gage) and lighter, ASTM C 954 for heavier metal framing, 3/8-inch head diameter, corrosion-resistant pan head screws; length and gage required by Code, or recommended by the metal framing manufacturer when not prescribed by Code.
2. For soffits and overhead surfaces, use with appropriate washers but not less than one-inch OD by 1/4-inch ID by 54 mils thick (16-gage) cut washer.
3. Screws for gypsum board mounted on resilient channels shall have a maximum length of one-inch for one layer and 1-5/8-inch for 2 layers.

B. Shot pins: 0.140-inch diameter low velocity powder-actuated drive pins equivalent to Ramset/Red Head No. 1508, or equal, with 7/8-inch minimum penetration into concrete.

C. Anchor bolts: ASTM A 307, non-headed type.

D. Expansion shields: FS FF-S-325, except do not use lead, fiber and plastic shields.

E. Furring channel clips: Manufacturer standard clips for attaching gypsum board furring channels to runner channels.

F. Welding electrodes: ASTM A 233, as recommended by AWS for the conditions of use and the metals to be welded.

G. Wire: ASTM A 641, galvanized, soft-annealed steel, minimum gage as follows.

1. Ceiling and soffit suspension system: 8 BW gage.
2. Furring channel to runner channel: 16 BW gage.
3. Ties and splices in channels: 18 BW gage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, measurements, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

1. Ceiling anchorage:
    a. Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.
    b. Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLATION VERTICAL FRAMING

A. General:

1. Erect metal framing systems in compliance with their manufacturer's recommendations, the reference standards, the Drawings and these Specifications.
2. Use minimum 33 mils thick (20-gage) studs at the following locations:
    a. Door openings.
    b. Studs supporting cement backer boards.
    c. Studs supporting backing plates, plumbing fixtures and wall-supported cabinets.
    d. Elsewhere as indicated.

3. Do not attach metal framing and suspension wires to ducts, conduits or pipes. Do not allow metal framing and suspension wires to contact pipes.
4. Isolate framing from transfer of structural loading, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
5. Cut framing components squarely for a tight fit against abutting members. Erect framing plumb and level to provide solid backing for finish materials. Install all steel studs in a wall/partition so that their flanges point in the same direction.
6. Do not exceed a 1/8-inch in 10 feet deviation (non-cumulative) from true lines and levels, or 1/4-inch from true position. Perform necessary remedial work on framing to achieve specified tolerances.

B. Locations where used:

1. Walls between toilet stalls.
2. Fireplace framing.
3. Bracing of Display Cases.
4. Interior gypsum board suspended ceilings.
5. Exterior Portland cement plaster.

C. Wall/partition framing:

1. Layout partitions, soffits and ceiling breaks, and permanently mark on slabs and soffits.
2. Align and securely anchor ceiling and floor tracks to building construction.
3. Space anchors within 6 inches of ends of each track segment and at 24 inches o.c. maximum. Do not drive fasteners closer than 2 inches to slab or curb edge.

4. Frame all openings in stud walls. Provide double studs, closer spacing, and additional reinforcement as detailed or required at door frames, borrowed light frames (interior windows), and recesses for equipment.
5. Frame both sides of control joints in gypsum board surfaces, and Portland cement plaster surfaces with separate studs and discontinuous runner; do not bridge the joint with system components or accessories.
6. Assemble corners using a minimum of 3 studs.
7. Install studs in single length, without joints, extending from floor to underside of floor or roof structure above, except where indicated on the Drawings to stop at or above suspended ceilings. Splicing studs is not permitted without the Architect's approval.
8. Where studs stop at or above suspended ceilings, unless otherwise indicated, brace every fourth stud (maximum) with opposite stud bracing at 45-degree angle securely anchored to the floor or roof above.
9. Offset studs where required so that finished wall surface will be flush.
10. Where curved walls are indicated, space studs at no more than 9 inches o.c.; space stud closer where radius requires it. Cut outside leg and entire web of runners at 2 inches intervals for the length of the arc then attach a 1-inch wide by 18 mils thick (25-gage) steel strip securely inside the cut leg of runners lapping uncut leg a minimum of 4 inches.

    a. As an option to the above, Contractor may use curved runners by Radius Track or Flex-C Trac by Flex-Ability Concepts.
    b. Position a stud at the beginning and end of each arc, with intermediate studs equally spaced between end studs of arc.

11. Attaching studs to runner:

    a. Attach studs to tracks by friction fit for single stud gypsum board partitions.
    b. Attach the following studs to runner tracks with screws or with a crimping tool in compliance with the stud manufacturer's printed instructions, except where indicated to be welded.

        1) Studs with gypsum board on only one side.
        2) Studs supporting lath/plaster assemblies.
        3) Studs supporting stone veneer and tile**.**
        4) Studs on each side of doors and windows.
        5) Studs supporting wall hung plumbing fixtures.
        6) Studs supporting wall hung urinal screens, toilet compartments, cabinets and equipment.

    c. Attach corner studs, partition intersections, studs on each side of door jambs, and other openings in walls/partitions as specified in Paragraph "b" above.
    d. Weld studs where indicated on the Drawings.

12. Unless otherwise indicated, provide horizontal stiffeners consisting of 3/4-inch channels spaced at not more than 54 inches o.c. maximum in all partitions/walls supporting wall supported cabinets and lath/plaster assemblies, and stone. Tack-weld stiffeners to each stud.

    a. Provide an additional 3/4-inch channel 6 inches above door head and extend 2 stud spaces beyond jamb studs.
    b. Install channels in longest possible lengths; lap 12 inches and wire-tie at joints. Do not tie channels on opposite sides of staggered and double stud partitions together.

13. Double gypsum board studs (face to face to form a tube) adjacent to doors and openings. Extend studs at door openings to slab or deck above and anchor securely to bottom track (as specified in subparagraph 10.b. above) and to top slab or deck with clip angles.
    a. Locate additional studs not more than 2 inches from door and window frames, abutting partitions, partition corners, and other construction.
    b. Install a section of track over door and window frames with a clip angle at each end and attach securely to the adjacent vertical studs.
    c. Install cut-to-length studs at the location of vertical joints and at standard spacing over the door frame header extending to the ceiling track.
14. Install studs 2 inches away from abutting concrete, steel columns or other structural elements. Extend the horizontal stiffeners and attach it to the structural element.
15. Provide additional framing, as required, for attachment of electrical boxes, fire extinguisher cabinets and similar items located in stud walls.

D. Resilient furring channels:

1. Install, with mounting flange down, at right angle to studs, starting within 2 inches of floor and 6 inches from ceiling.
2. Splice channels directly over studs and attach through both flange to studs.
3. Space channels as indicated on the Drawings.
4. Drive screws through channel attachment flange and studs at each intersection.

E. Resilient sound clips: Install the resilient clips in accordance with their manufacturer's instructions, and the following at the spacing indicated.

1. Install clips level and aligned on each wall.
2. Space bottom clips (and supported channel) no more than 3 inches from floor.
3. Space top clips (and supported channel) no more than 6 inches from ceiling.
4. Install furring channels securely in each clip.

3.4 SUSPENDED FRAMING FOR GYPSUM BOARD ASSEMBLIES

A. Space 1-1/2-inch main runners not over 4 feet o.c. in any dimension so that hanger wires do not support more than 12 square foot of ceiling. Attach hanger wires from in-place floors and roof as indicated on the Drawings. Do not use shot pins.
B. Hang suspended framing independent of walls, columns, pipes, ducts, and conduits, and their insulation.
C. Do not attach wires to, or bend around, interfering material such as ductwork, pipes and conduits. Provide trapeze, or equivalent devices substantiated by detailed Shop Drawings and calculations, where obstructions interfere with direct suspension.
D. Space runner channels not more than 6 inches from parallel walls or beams. Align runner channels accurately relative to indicated ceiling height and saddle-tie with hanger wires. Lap channels 12 inches at splices and tie at each end of lap.
E. Attach furring channels to runner channels with 16-gage tie wire or clips. Space at not over 12 inches o.c. for lath/plaster assemblies, and 16 inches o.c. for gypsum board. Locate approximately 2 inches from parallel walls. Lap channels 12 inches at splices and tie at each end of lap.
F. Assemble and install metal grillage so that it is rigid, square, and free of movement, and level within the tolerances specified.
G. Provide seismic bracing and compression struts as required by Code.

3.5 FURRING

A. Provide furring attached to concrete and metal framing to conceal utilities, furred soffits, and other furring as indicated.
B. Furring to receive gypsum board shall be screw-on channels directly attached to backing material or applied over runner channels as applicable.
C. Furring to receive plaster shall be 3/4-inch cold-rolled channels wire tied to 1-1/2-inch runner channels.
D. Space furring as indicated for studs.

3.6 WELDING

A. Perform welding in compliance with AWS recommendations. Welders shall be qualified to weld lightgage metal. Provide stitch plates where studs are burned-through.

3.7 BACKING PLATES

A. Backing plates may be omitted if anchorage for wall-hung items is directly into steel studs of 43 mils thick (18-gage) or heavier, or items are furnished with equal mounting devices.
B. Wall-mounted and wall-hung items that require backing plates, without limitation, include the following:

1. Wall supported railings.
2. Grab bars.
3. Toilet compartments and screens.
4. Toilet room accessories.
5. Lockers
6. Wall and base cabinets.
7. Plumbing fixtures.
8. Ladders.
9. Wall mounted door stops.
10. Bracket-mounted fire extinguishers.
11. Signage.
12. Window shades.
13. Wall mounted furniture.
14. Wall mounted bench in the shower stall.
15. Visual display and tack boards.

C. Unless otherwise indicated, plates not provided with fixtures and equipment shall be long enough to span, as a minimum, across 3 studs and may be one of the following:

1. Fifty-four mils thick (16-gage) minimum steel plate by 4 inches wide.
2. Fifty-four mils thick (16-gage) unpunched wide flange stud by 4 inches wide.

D. Notch studs so that backing plate will be flush with exterior face of stud.
E. Weld plates continuously along all contact surfaces at each stud crossing, or secure with 2 countersunk machine screws at each stud.

END OF SECTION

SECTION 09 24 00 - LATH AND PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Lath and lathing accessories.
2. Portland cement plaster.

B. Related requirements:

1. Division 03 for concrete.
2. Division 07 for air and water barrier.
3. Division 09 for field painting.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for fiber reinforcement, additives, metal lath and metal trim members.
B. Shop Drawings: Dimensioned drawings showing the following.

1. Windows and other openings and penetrations in plaster walls.
2. Proposed locations and types of metal lathing accessories (screeds, control joints, etc.) in plaster surfaces.
3. Schedule of proposed control joints and metal trim items keyed to minimum 1/8-inch scale building elevations.

C. Affidavit: Signed by materials supplier stating that sand delivered to jobsite complies with the requirements of this Section.

1.3 QUALITY ASSURANCE

A. Mockups: Assist in building composite mockup for each glass product indicated below in accordance with the following requirements, using materials indicated for the completed Work.

1. See Section 01 48 38 for composite mockup.
2. Build mockup in the location and of the size indicated or, if not indicated, as directed by Architect; finish as specified.
3. The Architect will inspect the mockup for color and texture. Make all corrections required, including the construction of additional mockups if the first one is disapproved, until Architect's approval is secured.
4. Promptly remove rejected mockup(s) from the jobsite and dispose of it (them) off the site.
5. The remainder of the cement plaster installed on the job shall match the approved mockup finish.

1.4 HANDLING

A. Delivery: Deliver materials, except sand and water, to the site in sealed containers or bags clearly identified with manufacturer's name, brand, type and grade.
B. Storage: Store lathing materials on platforms under plastic sheeting. Store plastering materials, including sand, on platforms under plastic sheeting to prevent hydration or contamination.

1.5 JOB CONDITIONS

A. Protect adjacent surfaces from damage as a result of plastering operations.
B. Protect plaster against extreme climatic conditions, including uneven and excessive evaporation from hot dry air.

PART 2 - PRODUCTS

2.1 LATHING MATERIALS

A. Paper weather barrier: Complying with UBC 94 Standard y14-1 and FS UU-B-790, Type I, Grade D (vapor permeable), Style 2, except with a water resistance of 60 minutes; Fortifiber Corp. "Super Jumbo Tex" or equal, to be applied over the Air and Water Barrier. Use two layers.
B. Lath:

1. Expanded diamond mesh lath weighing 3.4 lbs./square yard. made from zinc-coated (galvanized) steel sheet to produce lath complying with ASTM C 847, by Western Metal Lath, Amico West, Cemco,, or equal.
2. On solid surfaces use self-furred lath.

a. Self-furring, 3.4-lb. diamond welded wire lath complete with accessories: Mega Lath by Structa, or equal.

C. Tie-wire: Galvanized, annealed steel wire 16-gage for lath-to-supports and 18 gage for accessories-to-lath.
D. Screws: “Fastenseal” self-sealing screws conforming to ASTM F 1667, with a 0.125-inch diameter shank, a 7/16-inch diameter head, length to satisfy Code but not less than required to penetrate stud a minimum of 3 full threads, with an HDPE spacer containing butyl rubber, by Fasten Seal – no known equal.
E. Trim:

1. Hot-dip galvanized steel trim: Basis of design is for minimum 26-gage, supplied in longest obtainable sing lengths to minimize joints, by CEMCO or Stockton Products as indicated, or equal by Amico, Keene/Metalex Corp., Superior or Unimast Inc.
2. At locations where new trim will contact or continuation of existing trim, shapes shall be identical.

a. Control joint expanded wing control joint: “No. XJ15” by CEMCO.
b. Drip: "DHF" by Stockton.
c. Casing: “J-B with 3-1/2-inch solid flange” by Stockton.
d. Weep screed: “WWW-S” by Stockton.

2.2 PLASTERING MATERIALS

A. Pre-mixed, fiber-reinforced brown and scratch coats: “Fiber 47 Fastwall Scratch and Brown” by La Habra/Parex, “BMI 690 Plaster, Standard with Fibers” by Sika/BMI Products, or equal.
B. Pre-mixed finish coat:

1. 534 Sand Fine standard acrylic finish (16/20),.

C. Fiber glass reinforcing mesh: Heavy-duty glass fiber mesh with a coating compatible with Portland cement plaster, “CrackShield” by LaHabra, or equal by Omega Products International, Cota Industries, Inc., or Dryvit. Provide 48 inches wide rolls.
D. Acrylic admixture: “Acrylic Bonder” by La Habra, or equal by Synergy, C-Cure or Standard Drywall Products, Inc. Use same manufacturer's products for all plaster coats.
E. Reinforcing mesh adhesive: “Stucco Level Coat” by Parex, or equal compatible adhesive with brown and finish coats, as recommended by the mesh manufacturer.
F. Pipe and electrical boxes flashing: Quickflash assemblies by Quickflash Products – or equal, no known equal.
G. Sealant: Silicone sealant as specified in Section 07 92 00 Joint Sealers.
H. Bonding agent: As recommended by the plaster mix manufacturer.
I. Water: Potable and fresh, from domestic source.

2.3 PLASTER MIXES

A. General:

1. Mix each batch for the same amount of time.
2. Mix batches the same size, using the same amount of water, to ensure consistency.
3. Briefly re-mix before using (approximately 2 minutes).
4. Use immediately after mixing. Do not retemper.
5. Add admixture after dry components and the majority of the water are mixed. Mix no longer than required to provide a uniform mixture. DO NOT OVER-MIX.
6. Do not re-temper mixes over 20 minutes old.

B. Plaster proportions:

1. Base coats: Mix bagged sand/fibers with acrylic admixture (one quart for an 80 lbs bag of premixed scratch and brown coats, unless other proportions are recommended by the manufacturer.
2. Finish coat: Specified premixed finish coat.

C. Mixing: Mix as accurately as possible. Add ingredients to the mixer from calibrated containers. Do not use materials that are caked, lumpy, dirty or contaminated by foreign materials.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Prepare concrete surfaces to be plastered by bush hammering, or equivalent process, to obtain a14-inch minimum profile.
C. Before plastering begins, ensure that adjacent work is well protected with waterproof covers securely taped in place and Air & Water Barrier is installed to provide a watertight installation.
D. Before enclosing stud walls, thoroughly clean space of debris.
E. Correct other detrimental conditions before proceeding with installation.

3.2 GENERAL

A. The applicable provisions of ASTM C 1063 and C 926 govern the work of this Section, except as specified herein.

3.3 WEATHER BARRIER

A. Install 2 layers of the paper weather barrier over exterior weather barrier specified in Division 07, with a minimum number of fasteners. Lap shingle fashion per manufacturer's recommendation. No weather barrier is required on soffits, and on solid substrates not covered by a waterproofing membrane.
B. Lap weather barrier over flange of accessories to prevent direct contact between lath and accessories and to ensure watertightness.
C. Drape and continue weather barrier uninterrupted behind control joints.
D. Interface weather barrier with flashing materials to properly discharge water to the exterior. Correct absence of flashing prior to installing weather barrier.
E. Seal unused holes from fasteners in weather barrier with silicone sealant specified in Section 07 92 13.

3.4 LATHING

A. Comply with ASTM C 1063, except as specified below, and where Code requirements are more stringent.
B. Apply lath taut, with long dimension at right angle to supports. Work from right to left, extend both horizontal and vertical factory flaps. Make sure that paper weather barrier encloses all surfaces to be plastered.
C. Apply first course at bottom and work up. Make overlaps shingle fashion to assure waterproof joints; lap paper-to-paper and lath-to-lath. Stagger vertical joints. Lap joints one-inch minimum and horizontal joints 1/2-inch minimum. Wire-tie intermediate horizontal joints at 9 inches o.c. maximum.
D. Install metal lath panels so that each vertical joint is approximately centered in the panel beneath it. Wire-tie intermediate horizontal joints at 6 inches o.c. maximum.
E. Cut lath at control joints.
F. Attach lath to supports at 6 inches o.c.
G. At control joints, cut lath but continue paper backing uninterrupted behind lath.
H. Hold lath 1/4-inch clear of electrical boxes, columns and similar items projecting through the plaster.

3.5 METAL TRIM

A. Wire-tie at no more than 24 inches o.c. to lath or studs. Fastening accessories with screws is not acceptable.
B. Use trim in single length wherever length of run does not exceed longest standard stock length available. Miter or cope at corners with hairline joints, and seal with sealant specified in Section 07 92 13.
C. Set accessories level, plumb and true to line with a tolerance of not more than 1/8-inch in 10 feet. Shim as required and align joints with concealed splice or tie plates.

    1. Where joints meet, make sure that design is uninterrupted, and that joints between accessories are flush, in-line and hairline tight. Where joints occur between parallel stud or channel supports, install an additional support for the individual flanges.
    2. Accessories that butt each other need to be lapped, sealed, soldered or welded, and/or stripped with flexible flashing.

D. Install corner reinforcement at external corners.

E. Provide casing beads at the following locations:

1. Where plaster termination abuts other finishes, isolate casing bead from contact with adjacent finishes with 1/4-inch thick tape sealant specified in Section 07 92 00.
2. Where plaster termination is not covered by another finish or applied trim, provide cased opening by installing casing bead around perimeter of opening as detailed.

F. Control joints:

1. Install vertical control joint first, continuous from top to bottom of wall; install horizontal control joints second and split where it meets the vertical control joint.
2. Install joints plumb, level, evenly spaced where so indicated, and in one piece at the spacing indicated.
3. Follow manufacturer's directions for their installation.
4. Maximum area of plaster without control joints shall not exceed 144 sq. ft. within a ratio of 2 to 1.5 (width vs. height). Horizontal or vertical expansion joints shall be located and coordinated with Structural.

3.6 PLASTERING

A. General: Comply with ASTM 926, except as specified below, and where Code requirements are more stringent.
B. Type: Smooth-finished Portland cement plaster installed on metal lath and bonding agent without lath; one-inch total thickness where metal lath is used; ½-inch on CMU and concrete where bonding agent is used.
C. Allowable tolerances: Maximum deviation from true planes of finish plaster shall not exceed 1/8-inch in 10 feet when measured with a straightedge placed at any point on the plaster.
D. Protection:

1. Protect adjacent surfaces from damage as a result of plastering operations.
2. Protect plaster against extreme climatic conditions, including uneven and excessive evaporation from hot dry air.

E. Application - general:

1. Provide sufficient manpower and equipment to ensure a continuous operation free of cold joints, scaffold lines, texture variations, and other objectionable conditions.
2. Plaster surfaces in one operation once the application of any coat begins.
3. Stop plaster at control joints, edges or corners only. Plaster in one operation, full height and width between control joints.
4. Plaster flush with metal trim members and make corners square and true.
5. Where permanent grounds are too far apart to serve as guides for rodding, provide supplemental plaster screeds as required. Establish true surfaces with rods before setting the screeds. Keep grounds clean and free of plaster.
6. Finish plaster in a true, plumb or level plane flush with grounds.

F. Bonding agent: Apply to concrete and CMU substrates in accordance with their manufacturer’s instructions.
G. Plastering:

1. Scratch coat (not required on bonding agent – concrete and CMU): Apply with sufficient material and pressure to form good full keys, and to cover well.

a. Thickness of scratch coat shall be 1/2-inch when measured from backing to crest of scored plaster.
b. Scratch before plaster hardens to provide sufficient mechanical key for brown coat.
c. Cure acrylic-modified plaster in accordance with its manufacturer's instructions, including holidays and weekends. Do not over-wet by excessive curing, unless hot conditions exist.

2. Brown coat (may also be referred as “leveling coat on the Drawings):

a. Dampen the scratch coat thoroughly and apply the brown coat to a 3/8-inch thickness. Do not dampen the bonding agent.
b. Bring to a true, even surface by rodding and floating, and leave slightly rough to receive the reinforcing mesh.
c. Begin floating only after hydration of the cement commences and sufficient moisture has evaporated, so that surface sheen has disappeared, but before plaster has become too rigid to be moved under the float.
d. Cure acrylic-modified plaster in accordance with its manufacturer's instructions, including holidays and weekends. Do not over-wet by excessive curing, unless hot conditions exist.

3. Reinforcing mesh adhesive:

a. After the brown coat is properly cured, apply a layer of reinforcing mesh in a 1/8-inch thick bed of cement adhesive.
b. Cement adhesive may be a proprietary adhesive as specified, or a job-mixed preparation consisting of 48 lb. of common Portland cement, 10 lb. of plaster grit silica sand, and emulsified acrylic admixture mixed with water.

4. Reinforcing mesh: The mesh is required over the brown coat and shall be completely embedded as follows by 3 different methods as selected by the Contractor and successfully demonstrated on the approved mockup. In all cases, completely embed the mesh into the base coat free of wrinkles and fish mouths, and trowel smooth, ensuring that no mesh is visible. A minimum 2-inch overlap is required at mesh joints.

a. Method One: After application of brown coat and before final set occurs, fully embed mesh into the brown coat.
b. Method Two: After brown coat has properly cured, apply the base coat over the brown coat a minimum of 1/6-inch thick and completely embed mesh.
c. Method Three: The finish surface must be clean and free of loose debris, dirt, dust, efflorescence, grease, oil, curing agents and cleaning solutions. Painted or glossy surfaces may need to be roughened to ensure proper bond of the base coat. The substrate must be structurally sound. Apply the base coat over the existing finish a minimum of 1/6-inch thick and completely embed mesh.
d. After embedding mesh, the surface shall be left suitable for the application of the finish.

5. Finish coat: Apply finish coat when temperatures are between 65 and 90 degrees F.

a. Apply the finish coat in a double back operation to a total minimum thickness of 3/16-inch.
b. Trowel on a tight first finish coat a minimum of 1/16-inch thick and draw it up to an even surface before applying the double back coat.
c. When the finish coat sets, trowel it to smooth and even surface free of tool marks, blemishes or cracks, matching the approved mockup in all respects, as approved by the Architect.

H. Plaster flush with metal frames and other built-in metal items or accessories which act as plaster grounds. Provide a "V" cut with the edge of the trowel where plaster abuts metal frames.

I. Where permanent grounds are too far apart to serve as guides for rodding, provide supplemental plaster screeds as required.

1. Establish true surfaces with rods before setting the screeds.
2. Keep grounds clean and free of plaster.
3. Finish plaster in a true, plumb or level plane flush with grounds.

J. Entire plaster must be flush with top of accessories; wavy finish (higher at accessories than in the field) is not acceptable.

3.7 FIELD QUALITY CONTROL

A. The curing periods recommended by the manufacturer shall be considered as minimum requirements. Be responsible for determining the most effective procedure for curing and time lapse between application of coats, based on climatic and job conditions.

B. Completed plaster shall match approved mockup, be within the tolerances specified, be uniform in thickness, texture and color when applicable, free of cracks, blisters, pits, checks and other defects.

C. Repair, or remove and replace, as determined by the Architect, lath/plaster that does not meet these requirements, with materials satisfactory to the Architect.

3.8 REPAIRING/CLEANING/PROTECTING

A. Cut, patch, repair and point-up defective plaster. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces. Point-up finish plaster surfaces around items built into, or penetrating the plaster.

B. Promptly remove plaster spatter and droppings from adjacent surfaces. Repair surfaces which have been stained, marred or otherwise damaged during plastering operations at no additional cost to the Owner.

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Gypsum board.
2. Fasteners, joint reinforcing and finishing compound.

B. Related requirements:

1. Divisions 05 and 09 for metal framing supporting gypsum board (except for framing specified herein).
2. Division 08 for access panels in gypsum board surfaces.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for all materials to be used in gypsum board construction.
B. Shop Drawings: Show proposed locations of control joints. Joint locations is subject to the Architect's approval and shall be relocated, when requested, at no cost to the Owner.
C. Samples: Three 24-inch square Samples with the level 4 finish for architect's approval. Approved sample will become Architect's control sample.

1.3 QUALITY ASSURANCE

A. Requirements of regulatory agencies:

1. Comply with fire resistance ratings indicated and required by Code.
2. Provide materials, accessories and application procedures listed by UL or tested in compliance with ASTM E 119 for the type of construction shown.

B. Mockup:

1. Where directed, construct a mockup of a gypsum board wall and ceiling inside the building. Make mockup full height (minimum 8 feet high by 8 feet wide) with a 4-foot return.
2. Tape and finish joints, trim and screw heads as specified for Level 4 herein. Refer to Section 09 90 00 for painting of the mockup with a semi-gloss paint.
3. The Architect will review the mockup under various light conditions for defects and improperly finished joints, trim and screw heads. Provide a portable light for that purpose when so requested.
4. Make corrections requested by the Architect or remove and replace mockup when the corrective work is not acceptable to the Architect.
5. The approved mockup shall remain in the building until its removal is directed and will be used as a standard for the gypsum board work for the Project.

1.4 HANDLING

A. Procedure: In accordance with GA 801 "Handling and Storage of Gypsum Panel Products."
B. Storage: Do not overload the floors with localized concentration of gypsum board.

1.5 JOB CONDITIONS

A. Comply with the gypsum board manufacturer's recommendations and GA “Application and Finishing of Gypsum Board” for temperature limitations and ventilation before, during and after installation of gypsum board.
B. Protect installed materials from drafts during hot, dry weather.
C. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. American Gypsum.
B. CertainTeed Gypsum.
C. Continental Building Products LLC.
D. G-P Gypsum Products.
E. National Gypsum Co./Goldbond Building Products Division.
F. PABCO Gypsum.
G. US Gypsum Co.

2.2 GYPSUM BOARD

A. General:

1. Provide boards complying with ASTM C 1396 as follows and in maximum lengths available to minimize end butt joints.
2. Unless otherwise acceptable to the Architect, no end-to-end butt joints are allowed on walls or ceilings less than 12feet long or wide.

B. Under ceramic tile: CertainTeed “GlasRoc,” G-P Gypsum “Dens-Shield Fireguard Tile Backer,” or equal paperless, mold-resist gypsum board complying with ASTM D 3273. Gold Bond “eXP Tile Backer” by National Gypsum complying with ASTM C1178 is also acceptable.
C. In unlined air shafts and plenums: USG Sheetrock “Mold Tough,” National Gypsum “XP Mold & Moisture Resistant Gypsum Board, or equal meeting ASTM D 3273 for mold-resistance.
D. Core board: One-inch thick equivalent to USG “Sheetrock Brand Gypsum Liner Panels” or Gold Bond “Shaftliner”.
E. On ceilings: Contractor may use “Gypsum Ceiling Boards.”

1. ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.
2. Thickness: 1/2 inch (12.7 mm).
3. Long Edges: Tapered.

F. For surfaces to be painted in toilet rooms: CertainTeed “Glasroc,” National Gypsum eXP Tile Backer, or equal embedded glass mat gypsum panels.

G. Elsewhere where gypsum board is exposed and painted: Standard, Type X or C boards, as applicable to the assembly. Provide boards with paper face suitable to receive decorative finish, and long edges tapered to receive joint compound.

2.3 ACCESSORIES

A. Screws: The following sized in compliance with the gypsum board manufacturer's instructions and Code requirements.

1. ASTM C 954 for fastening to supporting studs and furring.
2. ASTM C 1002, Type G for gypsum board-to-gypsum board.

B. Metal trim: Except where extruded aluminum reveals are indicated, provide Galvanized steel of the types specified hereafter complying with ASTM C 1047.

1. Extruded aluminum trim: Profiles and dimensions indicated.
    a. Basis of design: Fry Reglet Corp.,
    b. Flannery, Inc.
    c. Gordon Architectural + Engineered Solutions.
    d. Or equal.

2. LC-Bead: J-shaped; exposed long flange to receive joint compound; use at exposed panel edges.
3. CB corner bead: Square corner bead.
4. L-Bead: L-shaped; exposed long leg to receive joint compound; use where indicated.
5. U-Bead: J-shaped; exposed short flange not to receive joint compound; use at exposed panel edges.
6. Curved-edge cornerbead: With notched or flexible flanges; use at curved openings.
7. Control joint: USG No. 093, Goldbond Building Products E-Z Strip or Trim-Tex 093V.

C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate
D. Column and beam clips: “Claw” by Claw International, or equal.
E. Joint tape, compound and laminating adhesive: ASTM C 475, low or very low shrinkage, type recommended by the manufacturer, by Hamilton Materials, basis of design, USG or one of the gypsum board manufacturers named above.

1. Taping, and fastener and metal trim concealment: Sheetrock Brand Taping Joint Compound, Ready-Mixed by USG.
2. Topping, finish and skim coats: Sheetrock Brand Topping Joint Compound, Ready-Mixed by USG.
3. Joint tape complying with ASTM C475: Sheetrock Joint Tape – Heavy by USG.

F. Sealants: As specified in Section 09 80 00.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions affecting the work of this Section at site.

B. Verify framing members' straightness and alignment.
C. Correct detrimental conditions before proceeding with installation.
D. Before enclosing stud walls and spaces that will be inaccessible after gypsum board is installed, thoroughly clean [**floor tracks and**] spaces of debris and dust.

3.2 GYPSUM BOARD INSTALLATION - GENERAL

A. Comply with the applicable provisions of the reference standards and the following.
B. Use only full-size boards above door and window openings; joints at corners of heads are not acceptable.
C. Minimize butt joints and avoid butt joints centered on walls, over protruding studs, and above doors and windows. Avoid abutting end joints in the central area of each ceiling.
D. Install all panels, including those in non-rated applications, with joints in moderate contact.
E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints.
F. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends.

1. Do not place tapered against cut edges or ends.
2. Where square (non-tapered) joints abut on ceilings, use Trim-Tex "Buttboard" behind the joint in accordance with Trim-Tex recommendations.

G. Stagger vertical joints over different studs on opposite sides of partitions.
H. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
I. Attach gypsum panels to framing provided at openings and cutouts.
J. Provide perimeter relief where board abuts structural decks, ceilings, vertical structural elements, or glazed assembly.
K. Install horizontal boards first. Butt joints between boards loosely. Do not force boards into place. Place tapered or wrapped edges next to one another.
L. Attach boards to all studs and furring members with power-driven screws securely engaging supporting member, and with fastener heads uniformly depressed not over 1/32-inch below surface of board (except for first layer of multiple layer assembly) without breaking face paper.
M. After boards have been installed over screws and backing plates, tap boards with a rubber mallet to depress backside of board over heads to eliminate unacceptable bulges.

3.3 SINGLE LAYER APPLICATION

A. Horizontal surfaces:

1. Install board with long dimension at right angle to supports, with end joints located over supports.
2. Use maximum practical length boards to minimize end joints. Stagger end joints in alternate boards.

B. Vertical surfaces: [**Except as specified for curved surfaces below, and**] Unless otherwise acceptable to the Architect, install board vertically. Use floor-to-ceiling length boards (unless height exceeds 12-foot) with vertical joints located over supports.

1. At [**stairwells and other**] high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
2. Offset joints at least one stud on opposite sides of partition/walls.

3. Extend gypsum board continuously from finish floor to underside of structure above, except where indicated otherwise on the Drawings.

3.4 MULTIPLE LAYER APPLICATION

A. On vertical surfaces:

1. Install board vertically using floor-to-ceiling length boards (unless height exceeds 12 feet) with vertical joints located over studs.
2. Offset joints at least one stud spacing on opposite sides of partitions and between subsequent layers of gypsum board.
3. Fasten all layers of gypsum board to metal framing with screws.

3.5 ALLOWABLE TOLERANCES

A. Do not exceed 3/16-inch in 8 feet, and 1/8-inch in 4 feet from plumb, level and flat (all directions) in gypsum board surfaces.
B. Do not exceed 1/16-inch offset at joints between boards.
C. Shim boards as necessary to comply with these tolerances.

3.6 SEALANTS

A. The following is required at perimeter and penetrations of all gypsum boards in pressurized stair shafts and air plenums. These areas must be air-tight at the design pressures indicated.

1. Clean space to be calked of debris, dust and powdered materials which would prevent the sealant from adhering properly.
2. Seal openings between gypsum board and the perimeter of items penetrating gypsum board, such as electrical boxes, continuously using sealant specified.
3. Seal openings between the gypsum board, and floors and ceilings along gypsum board assemblies continuously, and along those intersecting assemblies for a minimum distance of 3-foot on each side. When multiple layers occur, seal the perimeter of each layer continuously.

3.7 FINISHING

A. Finish gypsum board surfaces with exposed joints, corners and edges reinforced or trimmed in compliance with GA-216, the following and to match approved mockup where applicable.
B. General:

1. Fill joints, fastener heads, trim accessory flanges and surface defects with joint compound in compliance with the gypsum board manufacturer's recommendations to obtain a smooth, flush surface.
2. All joints, fastener heads and trim flanges in surfaces which will remain exposed to view in the building, shall be invisible after application of joint tape and compound.
3. Fill and finish gypsum board-clad columns with a straightedge from corner bead to corner bead to eliminate concave surfaces between beads.

C. Trim: Install in single unjointed length, unless length exceeds manufacturer's standard. Attach to gypsum board in compliance with their manufacturer's instructions.

1. Install Type CB trim at external corners.

2. Install Type LC trim where gypsum board edges are exposed in the finish work.
3. Install Type CB or LC trim where gypsum board abuts a different material, and the edges are not covered by a finish material.
4. Install control joints at no more than 30 feet o.c. in any direction (full height door frames count as control joints). Joint locations are subject to the Architect's approval. When "through wall" control joints are required in fire-rated assemblies, comply with WH International, Inc. Report WHI 651-0318.1.

D. Joints: Reinforce joints between gypsum boards, and interior corners and angles with tape set in joint compound.

1. Apply skim coat over tape in one application.
2. Where space greater than 1/16-inch occurs between abutting gypsum boards (except at control joints and for concealed layers of multiple layer assemblies), pre-fill joints with joint compound and allow to dry before applying joint tape.
3. All joints and interior angles shall have tape embedded in joint compound and 2 separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles.

E. Joint compound:

1. Lap each coat not less than 4 inches over the preceding coat (2 inches on each edge). Width of joint compound on tapered board edges shall be not less than 12 inches; width of joint compound on square board edges not less than 18-inch.
2. Cover fastener heads and accessories with 3 separate coats of joint compound.
3. Allow at least 24 hours drying time between applications of joint compound.
4. Finish joint compound so that little or no sanding is required. When sanding, use sandpaper or mesh cloth with grit as fine as possible; do not scuff face paper. Remove sanding dust before painting or applying other finishes.

F. Finishing levels:

1. Level 0: Use for first layer of multiple layer construction and gypsum board ledge guards in elevator shaft.
2. Level 1: Use in plenum areas above ceilings, interior faces of shafts, in attics, and in areas where the assembly will generally be concealed.
3. Level 2: Use where gypsum tile backer board is used as a substrate for tile, in storage and similar areas where surface appearance is not of primary concern.
4. Level 3: Not used.
5. Level 4: Use for all other areas to be painted and where light texture or backed lightweight wall covering will be applied.
6. Level 5 – skim coat (spray and roller-applied finish is not acceptable):
    a. Use for areas receiving wall coverings or painted with a semi-gloss or gloss paint. Finish, including joints and fasteners as follows to match approved mockup.
    b. Apply a thin skim coat of joint compound to the entire surface to result in a smooth surface free of tool marks and ridges. Use setting-type, sandable topping compound or drying-type; do not use all-purpose compound consisting of high-build interior coating product designed for application by airless sprayer.

G. Skim coat on concrete surfaces: Apply over clean, dry concrete surfaces to a smooth, uniform finish free of trowel marks and other defects. Match approved mockup.
H. Leave gypsum board surfaces smooth, undamaged and ready to receive scheduled finishes.

END OF SECTION

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Ceramic tile, and trim shapes.
2. Porcelain tile.
3. Setting materials, grouts and sealants.
4. Stone thresholds.
5. Floor sealer.

B. Related requirements:

1. Divisions 07 and 09 for sealants other than specified herein.
2. Division 09 for lath and scratch coat on walls.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to start of installation arrange a pre-installation meeting between the Contractor, and the tile installer to review Project conditions, the Drawings, Specifications and the waterproofing manufacturer data. The Architect may attend.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Identify areas of concern and remedial measures.
4. Record meeting minutes and distribute copy to all concerned, including the Architect, within 48 hours after the meeting.

B. Manufacturer’s inspections:

1. Request the manufacturer's presence before start of this work to verify substrate acceptability, and as required thereafter to review installation procedures and completed work, and to issue warranty specified.
2. Unsatisfactory conditions disclosed by the manufacturer visits to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data for waterproofing membrane, pre-mixed mortars and grouts, with certification that they meet ANSI standards specified.
B. Shop Drawings:

1. Show locations of each type of tile and tile pattern; widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

2. If joints occur in substrate to be tiled, show their locations on the Shop Drawings.

C. Samples:

1. Twenty-four-inch square Samples of each type and color of tile glued to hardboard backing; grout joints.
2. Each type, color and shape of trim and base.

D. Test Results: Submit test results in accordance with the test methods specified performed by a certified testing laboratory for each material specified.

1.4 QUALITY ASSURANCE

A. Uniformity:

1. Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
2. Obtain materials of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

B. Installer qualifications: Experienced firm who has successfully completed tile installations similar in material, design, and extent to that indicated for Project for at least 5 years.
C. Mockups: Before starting tile installation, erect one mockup for each form of construction and finish required. Build mockups complying with the following, using materials indicated for final Work.

1. Make each mockup a minimum of 6-foot square. Locate on site where directed by the Architect.

1.5 HANDLING

A. Procedure: In accordance with ANSI A137.1 for labeling sealed tile packages.
B. Delivery: Deliver tile cartons with grade seals unbroken.

1.6 JOB CONDITIONS

A. Set and grout this work when ambient temperature is at least 50-degree F or higher. Do not install materials on surfaces (or when ambient temperature) is less than 40-degree F.
B. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform this work and as will occur in the room or space after the building is in operation.

1.7 MANUFACTURER SPECIAL WARRANTY

A. Warrant tile installation, including grout and waterproofing (system warranty), against faulty materials and workmanship for 15 years after Substantial Completion.
B. Make repairs required during the warranty period at no cost to the Owner.

1.8 MAINTENANCE

A. Furnish one full box of each type, color and size of tile properly packaged and identified, by room or area.

PART 2 - PRODUCTS

2.1 MATERIALS – GENERAL

A. All components of the waterproofing and tile setting assemblies must be made or distributed by the same manufacturer to obtain warranty specified.

2.2 TILE

A. Factory-blending: For tile exhibiting color variations within the ranges selected during sample submittals, factory-blend tiles and package accordingly so that tiles taken from one package show the same color range as those taken from other packages, and match approved Samples.

2.3 SETTING MATERIALS AND GROUT

A. Portland cement: ASTM C 150, Type 1.
B. Sand: ASTM C 144.
C. Water: Potable, fresh.
D. Setting bed reinforcing mesh: 2-inch by 2-inch by 16/16, 3-inch by 3-inch by 13/13 or 1-1/2-inch by 2-inch by 16/13 wire complying with ASTM A 82 or A 185.
E. Thin set, latex modified dry-set mortar: The following or equal with physical properties equaling or exceeding those of the products specified. Do not apply more than 1/4 inch thick and do not use for tiles larger than 15 inches complying with ANSI A118.15, A118.4, A118.11 and ISO 13007 C2EP1.

    1. Thin set:

        a. MerKrete “705” and “735,” Mapei “Ultraflex 1 and 3,” or MerKrete “750 RS” or “Granirapid” as selected by the installer for the conditions of use.

    2. Custom (basis of design): FlexBond.
    3. Mapei: Ultra Flex III.
    4. Laticrete: 254 Platinum.

F. Portland cement grout: One of the following, or equal with physical properties equaling or exceeding those of the products specified, sanded or unsanded as applicable to the joint width and recommended by the grout manufacturer.

    1. Custom (basis of design): Sure Color Grout.
    2. Mapei: Ultracolor Plus.
    3. Laticrete: Perma Color.

2.4 MISCELLANEOUS MATERIALS

A. Sealant and backup for control joints in tiles: Refer to Section 07 92 00.
B. Tile Edging: Schluter trim pieces as detailed on drawings or equal.

    1. Toilet Room Base equal to Dilex-HKU.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Remove glaze and contaminants, including remaining adhesive and setting bed, from floors by scraping, wire-brushing or with a self-contained bead blasting apparatus.
C. Verify that surfaces to be tiled are firm, dry, clean, and free from oil or waxy films and curing compounds, and within the following tolerances:

1. Thin-set tiles:

a. 1/8-inch in 10 feet for floors and 1/8-inch in 8 feet for walls for tiles longer than 15 inches.
b. 1/4 inch for smaller tiles.

2. Maximum deflection of walls to be tiled: L/360 under loads prescribed by Code. Coordinate this requirement with other design criteria specified in Section 09 22 16.

D. Examine that installation of grounds, anchors, recessed frames, electrical and mechanical work, and similar items located in or behind tile have been completed before installing tile.
E. Correct detrimental conditions before proceeding with installation.

3.2 GENERAL TILE INSTALLATION REQUIREMENTS

A. General: Install proprietary materials in compliance with their manufacturer’s instructions. Press or beat the tiles to obtain 90 percent coverage of mortar on back of tile, except for the following which requires 100 percent coverage:

1. Tiles in “wet” areas.
2. Edges and corners of all tiles regardless of location.
3. Back butter tile if necessary.

B. Environmental conditions: Maintain minimum temperature limits and installation practices recommended by mortar and grout materials manufacturers in areas where this work is performed.
C. Terminations: Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment. Saw-cut and drill tiles to obtain tight fitting, clean, sharp, undamaged cut edges.

1. Rub cuts smooth with fine abrasive stone.
2. Cut and drill so that electrical outlets, plumbing fixtures, pipes, fixtures and fittings standard plates, escutcheon and collars will overlap the tile.
3. Do not cut or split tile at penetrations.

D. Visual requirements:

1. Install tile in patterns indicated with uniform joints and perimeter units not less than 1/2 unit wide. Adjust to minimize cutting.
2. Accurately set tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required.
3. Form corners, returns, and exposed tile edges with approved trimmers.

4. Where tiles selected by the Architect are installed in the same plane, but are of a different thickness, it is the Contractor responsibility to adjust the setting bed or mortar thickness so that all tiles are flush.
5. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body remains exposed after tile is installed.
6. Provide matching tile trimmers of all types required to prevent such condition.

E. Tolerances: Maximum deviation from true lines and levels shall not exceed 1/8-inch in 8-foot for walls.
F. Sealant: Calk penetrations in tile with sealant and backing rod specified in Section 07 92 00. Provide movement joints where indicated or as recommended by TCNA Method EJ171-13.
G. Tile blending:

1. For tile exhibiting color variations within the ranges selected during sample submittals, verify that tiles have been factory-blended and packaged accordingly so that tiles taken from one package show the same color range as those taken from other packages, and match approved Samples.
2. If not factory-blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION METHODS

A. Wall tile: Install over cement board in compliance with ANSI A108.5 and TCNA installation method W244C.
B. Install metal trim pieces as recommended by manufacturer.

3.4 GROUTING/CURING

A. Grouting: Comply with ANSI A108.10. Finish joints of square edge tiles flush with tile surfaces; finish joints of cushion edge tiles to depth of cushion. Finish grout free of voids and pits.

1. Fill epoxy-filled joints flush with tile edges. The epoxy will cure to a slight depression.

3.5 SEALANTS

A. Comply with sealant manufacturer's instructions and ASTM C 1193.
B. Install backing rod and fill joints completely with sealant tooled below surface of tile. Do not disturb until fully cured.

3.6 FIELD QUALITY CONTROL

A. Plug drains and dam door and other openings after waterproofing is installed and flood the floor with approximately 2-inch of water.

1. Let the water stand undisturbed for 48 hours and check for leaks.
2. Repair discovered leaks and retest; repeat as necessary to stop leaks before proceeding with tile installation

3.7 CLEANING/PROTECTING

A. Cleaning:

1. Clean tile and repair faulty grouting. Sponge and clean surfaces with clean water and soft brushes.
2. Polish glazed tile after cleaning with clean, dry cloths.

B. Protect completed installations until acceptance by the Architect.
C. Protect floor tiles with reinforced Kraft paper or other heavy covering securely taped in place during the construction period to prevent damage and stains. Remove protection when no longer needed.
D. When recommended by tile manufacturer, apply a coat of neutral protective cleaner to completed tilework.
E. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
F. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
G. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tiles.

END OF SECTION

SECTION 09 51 24 – LINEAR WOOD CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical, linear wood ceiling assemblies.
B. Products furnished but not installed under this Section: Anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.
C. Related requirements: Division 09 for other suspended ceilings and acoustical insulation.

1.2 SUBMITTALS

A. Product Data: Manufacturer product data and installation instructions for all materials.
B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

C. Shop Drawings:

1. Ceiling and individual panel layout, seismic bracing, method of suspension where interference such as ducts and pipes exists, with light fixtures, grilles, sprinkler heads, speakers and access panels accurately located, and typical details of constructions and installation.
2. Detail Tee-rails, cross member spacing, perimeter conditions and joint conditions, seams, dowel cuts, field trim areas, and sheet metal pans and fire sprinkler heat baffles.
3. Detail perimeter condition full size in both reflected ceiling plan and section detail.

D. Samples:

1. 5- by 24-inch long, full width ceiling plank, showing straight edge detail, finished as specified.
2. Suspension system and perimeter trim member, with the specified finish.
3. Acoustical insulation.

E. Closeout: Cleaning and maintenance instructions.

1.3 QUALITY ASSURANCE

A. Fire rating: Combined assembly shall be Class A (I) fire rated. (UL No. 723).
B. Installer Qualifications: Firm with minimum 5 years documented experience in installation of suspended wood ceilings with at least 5 previous successfully completed projects of equivalent size and complexity in the past 5 years.
C. Mockup: To be determined.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
B. Before installing ceilings, allow components, other than metallic, to reach room temperature and stabilized moisture content.
C. Handle panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained for no less than 72 hrs at the levels indicated for Project when occupied for its intended use.

1.6 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.7 MAINTENANCE

A. Furnish extra materials consisting of 20 wood planks same as installed on the Project.
B. Wrap or box to prevent damage, label with contents, and deliver at the site where directed by the Contracting Officer.

PART 2 - PRODUCTS

2.1 TYPE/MANUFACTURER

A. Basis of Design: . Topakustik Wood Planks distributed by Design Insights Associates, 323.725.0400.
B. Or equal.

2.2 MATERIALS

A. Ceiling planks and acoustical backing: As scheduled in Section 09 06 00.
B. Fasteners:

1. Connect planks to the supporting grid with concealed grid clips.
2. No fasteners shall be visible on exposed face surfaces of ceiling panels or support Tees. Ceiling penetrations shall be neatly cut and finished.

C. Supporting Grid System: ASTM 635, heavy-duty, direct hung.

1. Straight, factory-formed, formed steel Tee in adequate thickness, to support loads.
2. Finish Tee in matte black.
3. Main runner locations shall not exceed 48 inches, spaced as shown on manufacturer’s shop drawings.

D. Hanger Attachments: 12-gage pre-straightened steel wires, rods or other approved device that will support required loads.

2.3 FABRICATION

A. Fabricate ceiling panels to the dimensions, profiles and details indicated on approved Shop Drawings, in compliance with WI Premium Grade.
B. Shop-fabricate panels to size to minimize field cutting and jointing. Where necessary to fit at site, provide ample allowance for cutting and fitting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
B. Proceed with installation only after unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install ceilings in compliance with the approved Shop Drawings and with their manufacturer's instructions, with uniform, flush, hairline joints.
B. Suspend ceiling hangers from building structural members and as follows:
    1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
    2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
    3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
    4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
    5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
    6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
    7. Do not attach hangers to steel deck tabs.
    8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
    9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Stagger end joints so that they are aligned every other plank.
D. Place acoustical insulation so mat side is facing up toward the air stream side of the plenum.
E. Install ceilings within the following tolerances:

1. One-eight-inch in 12 feet maximum deviation from level and flat of the completed ceilings when measured with a straightedge placed at any location on ceiling; 1/4-inch total deviation within any single area.
2. No offset between panels at joints.

F. Attach panels to suspension system with concealed (from floor) attachment devices standard with the manufacturer. Where fasteners cannot be concealed, countersink and plug. Finish plugs to match adjacent surfaces.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Government will engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Suspended ceiling system.
2. Hangers, anchors and fasteners.

B. Testing Agency: Government will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.

a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Remove and replace ceiling panel and hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.4 CLEANING

A. Clean exposed surfaces of ceiling panels, including trim, edge moldings, and suspension system members.
B. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage.
C. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 62 29 - CORK FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Cork flooring.
2. Accessories and installation materials.

B. Related requirements: Sections 14 20 00 and 14 27 50 for flooring in elevator S1 cab.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Arrange a preliminary meeting with trades associated with the work of this Section. Comply with Article 1.7 of Section 01 31 00 and the following.

1.3 SUBMITTALS

A. Samples: 24-inch square Sample of flooring material mounted on tempered hardboard. and 12-inch long samples of each linear accessory.
B. Shop Drawings: Drawings showing tile patterns, seam locations, where applicable. Seam locations are subject to Architect's approval and relocation at no cost to the Owner.
C. Certification for Slip Resistance: Certification that installed flooring complies with ANSI A137.1.
D. Recommendations: Furnish the Owner 2 copies of the flooring manufacturer recommended maintenance products and recommended maintenance methods and procedures.
E. With closeout submittals, furnish the following to Owner:

1. Copies of manufacturer’s recommended maintenance products and recommended maintenance methods and procedures.
2. Maintenance materials consisting of 25 full size tile.
3. Maintenance material shall not be used for replacing damaged tiles before final acceptance of the Work.

1.4 JOB CONDITIONS

A. Maintain temperature in spaces to receive flooring between 70-degree and 90-degree F for not less than 24 hours before and 48 hours after its installation.
B. Maintain minimum temperature of 60-degree F after flooring has been installed, except as specified above.
C. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.

1.5 MAINTENANCE

A. Furnish maintenance materials consisting of a full box of cork flooring of the same type and color range of cork flooring installed on the Project.

1.6 WARRANTY

A. Warrant the flooring material manufacturing defects and installation for a period of 15 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Materials, colors and finishes are specified in 09 06 00 Materials Colors Finishes.WF-1, Heirloom Cork Flooring by Expanko Resilient Flooring, basis of design, or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Slip Resistance: Meet the dynamic coefficient of friction prescribed by ADAAG of at least 0.42 or greater per 2012 ANSI A137.1. This will be accepted as meeting the intent of slip resistance requirements for CBC 11B-302 and ADA Standards 4.5.1.

2.3 MATERIALS

A. Edging and reducer strip: Aluminum or stainless steel profiles as indicated.
B. Primer adhesive and crack filler as recommended by flooring manufacturer.
C. Color: Light.
D. Tile size:

1. Size: 24-inches by 24-inches square.
2. Thickness: 1/2-inch thick.

E. Floor finish: As specified below. Floor finish, when cured, shall have a coefficient of friction of 0.5 or greater when tested in accordance with ASTM D 2047.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine substrates to receive countertops and conditions under which quartz countertops will be installed for compliance with installation tolerances and other conditions affecting performance.

1. Verify that subfloor is within a tolerance of an 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.
2. 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.
3. Level surfaces by grinding bumps and filling-in depressions to a tolerance. Use fill material compatible with both substrates.

B. Sweep and vacuum clean substrates to be covered with flooring before installation.

3.2 DRYNESS AND PH TESTS

A. Prepare concrete sub-floor according to ASTM F 710. and manufacturers' recommendations

1. Verify that substrate is 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 the manufacturer. Do not use solvents.
3. Perform alkalinity and adhesion tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

a. Perform slab dryness test recommended by the flooring manufacturer. Proceed with installation only after substrates have maximum
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

5. Check pH level and correct until it is within range recommended by the adhesive manufacturer.

3.3 ADHESIVES

A. Mix and apply adhesives in compliance with their manufacturer's instructions.
B. Provide safety precautions during mixing and applications as recommended by the adhesive manufacturer.
C. Apply adhesive uniformly over backing surfaces, but only on areas that can be covered by flooring material within the recommended working time of the adhesive.
D. Remove adhesive that dries or films over. Do not soil walls, bases, or other adjacent surfaces with adhesive. Promptly remove spillage from adjacent surfaces without damaging those surfaces.

3.4 CORK FLOORING

A. For tile exhibiting color variations within the ranges selected during Sample submittals, factory-blend tiles and package accordingly so that tiles taken from one package show the same color range as those taken from other packages and match approved Samples.
B. Install in accordance with its manufacturer’s instructions, in grid pattern with tight, flush, aligned joints.
C. Roll flooring into adhesive with heavy roller to eliminate air pockets and to thoroughly bond to the substrate.
D. Install cove strip at junction of floor and wall. Turn flooring up 4 inches without breaks, glue to wall and cover exposed top edge with metal trim installed in longest available length.

3.5 EDGING STRIPS

A. Install at termination of cork flooring where the flooring material is not covered by another material.

1. Install in one piece between door jambs, and in longest possible length elsewhere.
2. Butt tightly to flooring, where applicable, and scribe accurately to door frame and other abutting surfaces.
3. Glue securely to clean, dry subfloor.

3.6 QUARTZ THRESHOLDS

A. Use thin set mortar to secure to clean, dry subfloor.
B. Install level with a tight fit to door jambs.

3.7 FINISHING

A. In addition to the sealer/finish that has been factory-applied, after tiles are set and floor vacuumed and clean, apply 3 more coats of low sheen urethane varnish to the floor utilizing the same varnish that was factory-applied to the cork flooring. Apply uniformly without runs brush marks and holydays.
B. Coordinate selection of floor polish with Owner's maintenance service.

3.8 FINISHING/CLEANING

A. General:

1. Protect flooring against mars, marks, indentations, and other damage immediately after installation and polishing.
2. Use protection methods recommended by flooring manufacturer.
3. Do not move heavy and sharp objects directly over flooring. Place hardboard panels over flooring and under objects being moved.
4. Slide or roll objects over panels without moving panels.
5. Cover traffic lanes with undyed, untreated building paper taped securely in place. Remove at final cleaning.

B. Clean cork flooring not more than 4 days before dates scheduled for inspections intended to establish Substantial Completion.

1. Clean according to manufacturer’s recommendations.
2. If required to restore polish finish, and if recommended by flooring manufacturer, strip protective floor polish applied after completing installation before cleaning.
3. After cleaning, reapply polish to floor to restore floor finish according to flooring manufacturer recommendations. Coordinate with Owner's maintenance program.

C. Remove and replace materials that are damaged or cannot be cleaned as approved by the Architect.

3.9 FIELD QUALITY CONTROL

A. Field Testing for Slip Resistance:

1. Static Coefficient of Friction: A minimum reading of not less than 0.6 for wet, level floor is required and shall be documented, as determined by a certified NFSI walkway auditor using the ANSI A137.1 quality control test.
2. Dynamic Coefficient of friction: A minimum reading of not less than 0.42 for wet level floor surfaces is required and shall be achieved and documented, as determined by a certified NFSI walkway auditor using the ANSI A137.1 quality control test.
3. Test prior to request for Substantial Completion, after site and Project is cleaned.
4. Provide one test for every 1,000 square feet, or minimum one test for each area when less than 1,00 square feet.
5. Should an area fail to meet standard, refinish the surfaces until it meets the standard. Use of films or coatings to correct deficiencies is not acceptable.

END OF SECTION

SECTION 09 65 13 - RESILIENT WALL BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Rubber bases.
2. Adhesive.

B. Related requirements: Other Sections of Division 09 for resilient flooring.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing:
B. Pre-installation meeting:

1.3 SUBMITTALS

A. Samples: 12-inch long Samples of each type and color of base.
B. Data: Proof of compliance with specified requirements.

1.4 HANDLING

A. Store materials indoors at a temperature above 60-degree F for at least 24 hours before use.

1.5 JOB CONDITIONS

A. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
B. Maintain temperature in spaces to receive resilient bases between 70-degree and 90-degree F for not less than 24 hours before and 48 hours after its installation.
C. Maintain minimum temperature of 60-degree F after bases have been installed, except as specified above.

1.6 MAINTENANCE

A. Furnish 100 feet of each type and color of base for future maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A.
B.

2.2 MATERIALS

A. Rubber bases**:**

1. One-eight-inch thick, by height indicated on the Drawings, ASTM F 1861, Type TS (thermoset vulcanized rubber), Group 1 (homogeneous).
2. By Burke Flooring Products, Roppe Rubber Corp., Johnsonite, Flexco Co. or Mercer Products Co., Inc., of the color(s) selected by the Architect.
3. Top set base where no flooring and resilient flooring occur; straight (carpet) base at all other locations; do not use preformed corners.
4. In rolls minimum 100-foot long. Walls 20-foot or less in one piece; do not use short pieces.
5. Base shall be from same batch and run number for each color.

B. Adhesive: Type and brand recommended by base manufacturer for the conditions of use.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine walls for excessive moisture content and unevenness which would prevent the proper execution of the work of this Section. Fill cracks and sand down bumps.
B. Remove dirt, oil, grease, or other foreign matter from surfaces to receive bases.
C. Correct detrimental conditions before proceeding with installation.
D. Do not install bases until they are same temperature as space where they are to be installed. Move bases and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

3.2 ADHESIVE

A. Mix and apply adhesive in compliance with its manufacturer's instructions.
B. Provide safety precautions during mixing and application as recommended by the adhesive manufacturer.
C. Apply adhesive uniformly over backing surfaces, but only on areas which can be covered by bases within the recommended working time of the adhesive.
D. Tape adjacent surfaces to prevent migration and misapplication of adhesive.
E. Remove adhesive which dries or films over. Do not soil walls, bases, and other adjacent surfaces with adhesive. Promptly remove spillage from adjacent surfaces without damaging those surfaces.

3.3 BASE

A. At masonry surfaces, fill voids along top edges of base with base manufacturer's recommended adhesive filler material.
B. Match edges at seams or double cut adjoining lengths. Install with hairline, flush butt joints.
C. Locate end of runs not less than 36 inches from a corner, except where impossible due to length of wall.
D. Do not use pieces less than 6-foot long, except where impossible due to length of wall.
E. Do not use preformed corner pieces [**, except for vented base**].

1. Form inside corners on job from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.
2. Form outside corners on job from straight pieces of maximum lengths possible by shaving back of base at point where bending will occur. Remove a strip perpendicular to length of base and only deep enough to produce a snug fit without bends whitening or removal of more than half the thickness of base.
3. Form without producing discoloration (whitening) at bends.

F. Scribe base accurately to abutting materials.

3.4 FIELD QUALITY CONTROL

A. After adhesive sets, clean bases with a neutral cleaner recommended by the base manufacturer.
B. Verify that there are no open joints and that base is completely adhered for its full length. Re-install in fresh adhesive where applicable.
C. Protect completed installations from damage until final acceptance.

END OF SECTION

SECTION 09 68 13 – TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Carpet tile.
2. Adhesive.
3. Accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation conference:

1. Prior to start of installation, arrange a pre-installation meeting between the carpet installer, Contractor, Architect and electrical trade responsible for wire access, where applicable.
2. Mark chalk lines on the slab, showing pattern alignment for placement and pattern layout. Spray lacquer on chalk lines, after Architect has approved the locations.
3. Review the suitability of the subfloor to receive carpet. Verify flatness and levelness, pH and latent water content of slabs.
4. Identify areas of concern and remedial measures.
5. Photograph areas of concerns before and after remedial measures are taken.
6. Record meeting minutes and distribute PDF copy to all concerned, including the Architect, within 48 hours of the meeting.

1.3 SUBMITTALS

A. Data:

1. Manufacturer Product Data for carpet, adhesive and accessories.
2. Manufacturer′s recommended cleaning and maintenance instructions for carpet.

B. Samples:

1. Full size Samples of each type and color/pattern of carpet tile.
2. Twelve-inch long Samples of carpet edge guard profile.

C. Layout drawings: Three-eight-inch minimum layout drawings showing tile layout, pattern direction, if any, and pile direction.

D. Tests results:

1. Evidence that the carpet, accessories and adhesives to be used comply with Code requirements for combustibility, flammability and toxicity.
2. Results of test conducted on concrete (refer to Part 3 below) slabs prior to start of installation.

E. Manufacturer warranties: Published warranties as specified below.

1.4 QUALITY ASSURANCE

A. Installer qualifications: FCIB or IFCI certified carpet installers, unless otherwise acceptable to the Architect.

1.5 HANDLING

A. Procedure: In accordance with CRI 104 Section 5. Store carpet indoors in a protected location.
B. Delivery: Deliver carpet with manufacturer registry number attached and intact.
C. Storage: Sore carpet in bins to prevent pile crush. Temporary storage shall be in flat bins with a maximum height not to exceed 3 rolls.
D. Handling:

1. Transport carpet on flat dollies equipped with carpet cradles. Equip fork lifts with booms.
2. Bending or folding of individual carpet rolls is not recommended, however, if it is absolutely necessary for delivery purposes, under no circumstances shall carpet be left bent or folded for longer than 4 hours.

E. Conditioning:

1. Condition carpet and adhesive on site in a heated, dry space at a minimum temperature of 65-degree and a relative humidity between 10 percent and 65 percent for at least 48 hours before installation.
2. Maintain these conditions night and day during installation and for at least 72 hours after completion.

1.6 JOB CONDITIONS

A. Temperature: Maintain a uniform temperature, in the space being carpeted, in the range of 65 to 75 degrees F during and after carpet installation.
B. Lighting: Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
C. Ventilation:

1. Maintain fresh air ventilation in installation spaces in accordance with current guidelines of ASHRAE standard 62 published by American Society of Heating, Refrigerating and Air Conditioning Engineers.
2. During installation, maintain fresh air ventilation by utilizing exhaust fans, and by operating the ventilation system at full capacity. Exhaust air to the outside and avoid recirculation of air.
3. After installation, maintain fresh air ventilation for 48-72 hours at normal room temperatures by operating ventilation or exhaust fan system at full capacity. Open doors and windows, if possible to dissipate, and eliminate lingering odors from the installation.

1.7 WARRANTIES

A. Carpet manufacturer shall warrant the carpet as follows:

1. The life of the carpet shall be 15 years under normal conditions.
2. Primary and secondary backing shall not delaminate for the life of the carpet.
3. Twenty-pound tuft-bind, wet and dry, shall be warranted for the life of carpet.

4. Stain resistant properties shall be permanent and inherent in the fiber. Topically applied stain resistant treatments are not acceptable. Stain resistant properties shall not be removed by commercial cleanings and abrasive wear.
5. Carpet shall be warranted to be impervious to water damage.
6. There shall be no more than 10 percent face yarn loss for the life of the carpet.

1.8 MAINTENANCE

A. Furnish the following full-size units equal to 2 percent of amount installed for each type indicated, but not less than 2 full boxes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ADA requirements for new carpet:

1. Provide glue-down installation that complies with CBC Section 11B-302.
2. Carpet shall have a level loop, textured loop, or level-cut/uncut pile texture and maximum pile height of ½-inch per CBC Section 11B-302.
3. Carpet edges shall comply with CBC Section 11B-303.

B. Environmental Impact Standards for the Carpet and Rug Institute's Indoor Air Quality testing program:

1. Less than 0.05 mg/square meter/per hour of formaldehyde.
2. Less than 0.3 mg/square meter/hour of total volatile organics compounds (TVOC).
3. Less than 0.4 mg/square meter/hour of styrene.
4. Less than 0.05 mg/square meter/hour of 4-PC.
5. Conduct test over 24-hour time period.

C. State of Washington Protocol for Indoor Air Quality testing.

1. Provide Class I products as determined by testing identical products for critical radiant flux classification in accordance with ASTM E 648.
2. Testing shall be conducted by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

D. NBS smoke chamber test: Less than 450.
E. Static propensity:

1. 3 KV or less as tested in accordance with AATCC-134 (70-degree F at 20 percent R.H.).
2. Carpet shall retain its static control for the useful life of the installation.

F. Radiant panel (ASTM E 648): Class I.

2.2 CARPET TILE

A. Make: See Finish Schedule; To be determined.

2.3 CARPET ACCESSORIES AND INSTALLATION MATERIALS

A. Carpet edge guard: Rubber or vinyl extrusion by Mercer Plastics Co. or Johnson Rubber Co., designed specifically as carpet edge guard. The Architect will select Color(s).
B. Seaming tape: Roberts Industries No. 50-330 Supertape, or Orcon CT-3 Super Tape.
C. Adhesives:
D. Edge sealer: USG Durabond Carpet Square Adhesive D2, WW Henry Peach Glue, 3M Blue Glue, or equal adhesive formulated for heavy commercial approved by the carpet manufacturer.
E. Floor leveling material:

1. Provide a minimum of one 10 lbs. bag of Portland cement-based floor prep material for every 100 square yard of carpet to be installed.
2. Do not use gypsum-based materials.

F. Other miscellaneous materials: As recommended by the carpet manufacturer for the conditions of installation and use.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Comply with the applicable specifications and recommendations of the Carpet and Rug Institute (CRI), Standard for Installation of Textile Floor covering Materials CRI 104, except as noted.
B. Vacuum substrate immediately prior to carpeting and remove deleterious substances, which would interfere with the installation or be harmful to this work.
C. Prepare concrete surfaces in accordance with CRI 104 Section 6.1.1 and 6.2.

Check floors for moisture content. Be sure that they are sufficiently dry to receive carpet by testing for moisture emission rate per ASTM F 1869 relative humidity per ASTM F 2170 and alkalinity-pH in accordance with ASTM F 710. Allow sufficient time in the construction schedule to allow slabs to dry sufficiently, force dry slabs, or provide a compatible surface coating so that water vapor emission will be at a level acceptable to the floor-covering manufacturer. Do not install carpet in areas above the following limits or exceed the limint published by the manufacturer:

1. Moisture emission rates above 3.0 lbs.
2. Relative Humidity rates above 75%RH.
3. Digital Alkalinity-pH readings above 9.0 pH.

1. Notify Architect of excessive results in writing. Installation deems acceptance of on-site conditions.

D. Test the alkalinity level of the concrete using a Litmus test. If the pH is above a level unacceptable to the adhesive manufacturer, treat the surface so that the floor PH is within acceptable levels.
E. Remove dirt, oil, grease, or other foreign matter from surfaces to be carpeted and/or to receive floor filler.
F. Use a floor filler, recommended by the carpet manufacturer, to fill-in cracks, holes and other indentation marks; grind down bumps to flat surface. Floor under carpet shall not exceed an Ff of 25.
G. Correct other detrimental conditions before starting installation.

3.2 INSTALLATION

A. General:

1. Comply with the carpet manufacturer's instructions and recommendations, except as modified herein.
2. Align carpet with centerline of room or space, and adjust at edges for wall variations.
3. Dry lay carpet in one room before going further to verify side match, dye sequence, pattern and defects. Obtain Architect's approval of dry lay before installing the remainder of carpet tile.
4. Install carpet edge guard, where edge of carpet is exposed to traffic, in single length without joints except at changes in direction. Cut for a tight fit against abutting surfaces. Center under doors when applicable.
5. Extend carpet at the following locations:
    a. Under open-bottomed and raised bottomed obstructions, and under removable flanges of obstructions.
    b. Into closets and alcoves of spaces scheduled to be carpeted, unless another floor finish is indicated for such space.
    c. Under movable furniture and equipment.
6. Install carpet in one direction in each room and do not reverse direction at any locations.
7. Carpet shall have full adhesion to subfloor without loose edges.

B. Carpet tile installation:

1. Install in accordance with CRI 104 Section 14 and the following.
2. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment. Cut tiles to obtain clean, sharp edges.
3. Install tile by the stair step method in full bed of adhesive, with tight joints and perimeter units not less than 1/2 tile wide. Adjust to minimize cutting.
4. Install tiles so that the arrows on the back point in the same direction.
5. Fit tiles snugly to prevent gaps, but do not force into place so as to cause buckles. Align tiles to avoid trapping pile yarns in the joint.
6. Roll completed installation with a 35 to 75 lb. linoleum roller in both directions to ensure uniform bond everywhere.
7. Installation tolerance: Comply with appropriate Sections of CRI 104.

3.3 CLEANING/PROTECTING

A. Remove debris from installation, carefully sorting pieces to be saved from scraps to be disposed of.
B. Vacuum carpet with a commercial machine, with a rotating agitator or beater in the nozzle. Remove soiled spots.
C. Close areas to traffic during installation. Cover carpet in traffic areas with protective non-staining building paper. Do not use plastic sheeting.
D. Prior to acceptance of the Work, replace damaged and stained carpet with new carpet.

END OF SECTION

SECTION 09 80 00 - ACOUSTIC INSULATION AND SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: The requirements below apply to all rooms and spaces where partitions are indicated to be filled with acoustical insulation and where acoustical insulation is indicated over suspended ceilings. Section includes.

1. Acoustic insulation.
2. Acoustic sealants and related materials.
3. Acoustic pads, tape and gaskets.

B. Related requirements: Division 07, 22 and 23 for thermal insulation, including pipe and duct insulation.

1.2 SUBMITTALS

A. Manufacturer Product Data for materials specified below.

1.3 HANDLING

A. Store materials under cover, protected from moisture and off the ground or floor.
B. Remove insulation that becomes wet or damp immediately from the job site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Acoustic sealant and pads shall prevent transmission of airborne sound through cracks in the construction.

2.2 MANUFACTURERS/PRODUCTS

A. Batt insulation:

1. Low-density glass fiber insulation: Use for packing and filling small joints and openings behind sealants.
2. Long-strand glass fiber insulation of one to 2 pcf density, without covering, thickness as required.
    a. 700 Series Insulation by Owens-Corning Fiberglas.
    b. Microlite by Johns Manville.
    c. Toughgard Fiber Glass Duct Liner Insulation by CertainTeed.

B. High-density ceramic or mineral fiber safing:

1. For packing and filling large and/or critical openings, usually behind a sealant or putty.
2. Long-strand ceramic or mineral fiber insulation of minimum 6 pcf density, without covering, thickness as required. Mineral (glass and rock wool) fiber, flame spread and smoke developed in conformance with IBC requirements and other authorities having jurisdiction. Non combustible having a minimum density of 1.1 pcf and minimum Noise Reduction Coefficient of 1.10 at 1/3 Octave Center Frequency (Hz).

    a. “QuietZone Accoustical Batts” by Owens Corning.
    b. “Rockwool AFB - Acoustical Fire Batts” by Rockwooll Group.
    c. "Fibrex Sound Attenuation Batt (SAFB) Insulation" by Fibrex Insulations Inc.
    d. “Thermafiber” by Owens Corning.

3. Thickness; 2-1/2 inches, except as otherwise indicated.

C. Insulation in stud cavity:

1. Formaldehyde-free, unfaced fiber glass blankets, “Sound-Shield” by Johns Manville, “Greenguard” by Knauf, or equal complying with ASTM C 665, Type 1, unfaced.
2. Unless other indicated, provide insulation of same thickness as the stud depth. Select batt widths to match stud spacing and to be self supporting between the studs.

D. For application above ceilings, select batt widths to be supported on ceiling construction over the entire ceiling area.

2.3 ACOUSTIC SEALANTS & TAPE

A. Bulk sealant for closing small openings and joints up to a maximum of one-inch wide. Sealant backed with glass fiber packing, compressible joint filler or resilient backer rod. Do not use acetoxy silicone sealant where it might contact copper pipes.

1. Products:

    a. Pecora Corp.: AC-20.
    b. US Gypsum Co.: Sheetrock Acoustical Sealant.
    c. Tremco, Inc.: Acoustical Sealant.
    d. WW Henry Co.: Henry 313.

B. Fire-barrier (acoustical) putty:

1. For closing large openings and joints typically over one inch wide. Applied full depth or backed with a dense safing, as detailed.
2. Non-shrinking, highly-adhesive, minimum 40-pcf density fire-barrier putty.
3. Products:

    a. Series SSP Firestop Putty and Putty Pads by Specified Technologies Inc.
    b. Nelson FSP Firestop Intumescent Putty by Chargar Corp.
    c. Fiberfrax Fyre Putty by Unifrax.
    d. Hilti CP 617 and CP 617L, intumescent moldable firestop putty for electrical outlet boxes.

C. Foamed-in-place silicone sealant:

1. For closing electrical ducts and cable trays where they penetrate constructions. Apply full depth of construction between permanent or temporary dams.
2. Fire-resistant, minimum 17-pcf density, foamed-in-place silicone sealant.
3. Products: Fire Barrier 2001 Silicone RTV Foam by 3M Fire Barrier Products Division.

D. Fire-resistive acoustic foam tape: “Norseal V740FR” compressible, closed cell polyvinyl chloride foam tape with pressure sensitive adhesive by Saint Gobain, or equal.

1. Provide one-inch wide by not less than 1/4-inch thick, self-extinguishing, 6 pcf density UL-listed acoustical foam tape.
2. Furnish tape in rolls with protective release liner on non-adhesive face.

2.4 ACOUSTIC PADS

A. Use: For sealing the backs and sides of standard electrical back boxes. Select size to completely cover the box and overlap wall facing material at least one-inch.

1. Fire-rated assemblies:

a. Flamesafe FSP 1077 Putty Pads by WR Grace & Co.
b. Putty Pads by Specified Technologies Inc.
c. Hilti CP617 Putty Pads by Hilti.
d. 3M Fire Barrier Moldable Putty Pads by RectorSeal.
e. Putty Pads by International Protective Coatings.

2. Elsewhere:

a. Type FSP Firestop Putty Pads by Nelson Electric.
b. Lowry’s Outlet Box Pads by Harry A. Lowry & Associates.
c. Sound Pad #68 by L.H. Dottie Co.

B. Self-adhesive sponge neoprene pads:

1. For providing a compressible filler and acoustical seal in the gaps of slip joints. Set in place with 10 to 15 percent compression. Airtight splices work in length-wise direction.
2. Closed-cell sponge or foam neoprene of 8- to 12-pcf density, self-adhesive on one side, thicknesses and widths as required.
3. Products:

a. Type V760 Norseal Foam Sealants by American Saint-Gobain.
b. DS Brown Co.

C. Felt-lined metal sleeves:

1. For sealing around pipe, hanger rod or other round element penetrating a construction. Inside sleeve diameter to equal outside diameter of penetrating element. Exposed end of sleeve closed with acoustical sealant.
2. Products:

a. Pipe Isolator by Eleen.
b. P-R Isolator by Potter-Roemer.
c. Trisolator by Stoneman Engineering.

D. Self-adhesive bubble gaskets:

1. To seal around the edge of an operating access panels. Typically set on jamb or head frame or stop to act as a compression seal.
2. Nominal 1/4-inch by 1/2-inch compressible bulb of silicone rubber or polyprene with self-adhesive on one side.
3. Products:

   a. 5050 Self-Adhesive Gasket by National Guard Products.
   b. S88D or S88W Siliconseal by Pemko.
   c. 797 or 797W by Reese Enterprises.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Before installing insulation in stud walls, thoroughly clean space of debris.
C. Correct detrimental conditions before proceeding with installation.

3.2 ACOUSTIC PADS

A. Install acoustic pads behind all recessed boxes in walls that have acoustical insulation in their stud cavities.
B. Clean the contact area of loose and foreign material sin accordance with the pad manufacturer’s instructions.
C. Verify that all unused knockouts are plugged before installing the pad.
D. Center the pad and cover the back and sides of all electrical, telephone and CATV boxes in sound-insulated walls with the acoustical pad.
E. Mold around conduits and cables entering the box.
F. Mold pads tightly to the boxes and to the adjacent surfaces.

3.3 BATT INSULATION

A. Cut to fit irregular spaces, butt edges into firm contact with each other and adjoining surfaces.
B. Hand pack around pipes, ducts, conduits, electrical boxes, etc., as required to thoroughly fill all voids and spaces between framing members and to form a continuous acoustical barrier.
C. Comply with the National Electrical Code (NEC) for installation in proximity to light fixtures. Do not install insulation closer than recommended by NEC.
D. Where in-wall electrical conduit is parallel to the wall, slit the insulation halfway to bury the conduit in it. Where the conduit is perpendicular to the wall (penetration), do not oversize the penetration; tape the conduit to prevent sound leakage.
E. For application above ceilings, select batt width to be supported on ceiling construction over entire ceiling.

3.4 ACOUSTIC SEALANT

A. Comply with ASTM C 919 and the following.
B. Clean space to be calked of debris, dust and powdered materials which would prevent the sealant from adhering properly.
C. Seal openings between gypsum board and the perimeter of items penetrating gypsum board, such as electrical boxes, continuously using sealant specified.

D. Seal openings between the gypsum board and floors and ceilings along sound-insulated walls continuously, and along those intersecting walls for a minimum distance of 3-foot from insulated walls. When multiple layers occur, seal the perimeter of each layer continuously.
E. Seal gypsum board edges in contact with door frames continuously.

3.5 FIELD QUALITY CONTROL

A. Prior to closing-in of insulated assemblies, or prior to Substantial Completion for insulation that will remain exposed in the building, refit, reinstall and/or replace wet, damaged and displaced insulation.

END OF SECTION

SECTION 09 84 10 – SOUND ABSORPTIVE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Custom fabricated sound absorptive walls (AP-1).
2. Fasteners, hangers, wall brackets and other accessories for a complete installation.

B. Related work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 09 29 00 for plaster and gypsum board walls.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing
B. Pre-installation meeting

1.3 SUBMITTALS

A. Product data: Submit manufacturer’s product data including certified laboratory test reports and other data required to show compliance with these specifications.
B. Shop Drawings: Submit interior elevations showing location of the installation coordinated with wall-mounted devises including fire annunciation devises, wall registers, electrical devises and lights.
C. Samples: Submit 6-inch by 6-inch samples of representative panel with factory detailed edge, and representative samples of mounting devices and clips.
D. Manufacturer’s data: Include manufacturer recommendations for cleaning and refinishing fabric, including precautions against materials and methods which may be detrimental to finishes and acoustical performances.
E. Test data:
F. Manufacturer sound absorption data based on sound absorption tests and calculations in accordance with the latest editions of ASTM C 423, Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method and ASTM E 795, Standard Practices for Mounting Specimens during Sound Absorption Tests conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP).
G. Laboratory test data showing proposed product has been tested in accordance with ASTM C 423 and ASTM E 795 and has met or exceeded specified Noise Reduction Coefficient (NRC) rating required.
H. Satisfactory acoustical test data to verify that acoustical wall panels meet criteria specified.
I. Complete, unedited test reports for panel system prepared by an independent testing laboratory indicating full compliance with both acoustical and fire resistance performance requirements.

1. Fire tests shall be for a complete assembly, including perimeter and longitudinal butt joint framing extrusions, core material, and fabric covering as required by Appendix X of ASTM E 84 (NFPA 255).
2. Complete test reports for fabric covering prepared by an independent testing laboratory indicating compliance with specified fire resistance performance requirements.

1.4 QUALITY ASSURANCE

A. Code compliance: Materials shall be tested, listed and labeled for flammability, combustibility, and smoke developed by a testing agency approved by authorities having jurisdiction.
B. Mockup: Where directed, construct a mockup of the acoustical wall panels inside the building. Make panel full height by 8-foot wide.

1. Finish mockup as specified.
2. The Architect will review the mockup under various light conditions for defects and improperly finished joints. Provide a portable light for that purpose when so requested.
3. Make corrections requested by the Architect, or remove and replace mockup when the corrective work is not acceptable.
4. The approved mockup shall remain in the building until its removal is directed, or its incorporation into the Work is authorized by the Architect, and will be used as a standard for the remainder of the acoustical panels.

C. Pre-installation conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Project conditions: Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured to a condition of equilibrium.

1.6 LIMITED WARRANTY

A. Limited warranty: Provide manufacturer’s standard limited 3-year warranty against manufacturing defects in material or workmanship.

PART 2 - PRODUCTS

2.1 SOUND ABSORPTIVE PANELS:

A. Basis-of-Design: Conwed Foundation Acoustical Wall Panels or equal.

1. Construction: Composite core of dimensionally stable rigid fiberglass laminated with 16 – 20 pcf molded glass fiber and covered with a specially formulated fiberglass mat.
2. Core fiberglass density: 6 - 7 pcf.
3. Core laminated with 1/8 inch, 16 - 20 pcf molded glass fiber.
4. Assembly accessories: Provide optional kerfs/splines for abutting square-edge panels.
5. Recycled content: For fiberglass, 52 percent pre-consumer and 5 percent post-consumer recycled content.
6. Core thickness: 2-1/8 inch.
7. Width: 24-48 inches.
8. Length: 24-120 inches.
9. Corners: Square.
10. Edge profile: Square.
11. Edge treatment: Resin Hardened.
12. Corners: Fully tailored.
13. Finish type and color: Custom Paint Color.
14. Mounting type: Lay-in
15. Mounting type: Z-Bar to Z-Bar

16. Flammability (ASTM E 84): Panel components shall have a Class “A” rating per ASTM E 84.
17. Resistivity to heat or cold: R-factor of 4.16 per inch of thickness.
18. Acoustical performance: Values below are for panels mounted in accordance with ASTM C 423 (Type A Mount for wall panels) and vary by panel finish.
    a. Noise reduction coefficient (NRC) for 2-1/8 inch Thickness: 1.10.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Comply with the panel manufacturer's instructions, the approved shop drawings, and the following.
B. Install panels plumb, level, with hairline, flush joints, undamaged edges, and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations.
C. Install panels securely so that individual panels can be removed without affecting and damaging adjacent panels.

3.3 CLEANING/REPLACING

A. Clean soiled or discolored panels after installation.
B. Remove damaged or improperly installed panels and replace with new panels.
C. Replace fabric and panels damaged beyond satisfactory field repair with satisfactory materials.

END OF SECTION

SECTION 09 90 00 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Painting and finishing all interior and exterior exposed surfaces throughout the Project, except as excluded in Paragraphs B and C below.
2. Surface preparation, priming and coats of paint specified herein are in addition to shop priming and surface treatment specified in other Sections.
3. Paint all exposed surfaces whether or not colors are designated, except where the natural finish of the material is obviously intended or specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.
4. This Section also includes sealing joints between surfaces to be painted, except for joints designed to be expressed in the Work and joints between a natural finish and a painted surface.

B. Painting specified elsewhere:

1. Shop priming of ferrous metal items included under miscellaneous metal fabrications, hollow metal work, and similar work.
2. Finished (not primed) mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, except as specified in Article 3.4 below.
3. Prefinished glazed assemblies.
4. Pavement markings.
5. Toilet compartments and screens.
6. Exterior wall louvers.
7. Signage.
8. Piping identification.

C. Painting not included: Do not paint the following surfaces.

1. Insulation and its facing.
2. Roofing.
3. Steel decking.
4. Chain link partitions.
5. Finish hardware, except those items noted USP.
6. Flexible door and window seals and weatherstripping (paint exposed metal to match door frame).
7. Finished metal surfaces such as anodized aluminum, stainless steel, chromium-plating, copper, bronze, brass and similar finished materials will not require finish painting.
8. Painting is not required on walls or ceilings in concealed and inaccessible areas, such as furred areas, pipe spaces, duct shafts and elevator shafts.
9. Operating parts, labels and nameplates:

    a. Do not paint moving parts of operating units, mechanical and electrical parts, such as valve and damper operator linkages, sinkages, sensing devices, motor and fan shafts.

b. Do not paint over any nameplates, Code required labels, such as UL and FM, or any equipment identification, performance rating, name, or nomenclature plates.

1.2 DEFINITIONS

A. Paint: The term, as used in this Section, means all coating system components, including primers, emulsions, enamels, varnishes, stains, lacquers, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coat.
B. Definitions of painting terms: ASTM D 16, unless otherwise specified.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Phasing: Program cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

1.4 SUBMITTALS

A. Materials:

1. Copies of a complete materials list, identified by manufacturer name and product label or

B. Color samples:

1. Eight-and-one-half- by 11-inch samples of each color for painted finishes.
2. Provide stepped samples, defining each separate coat, including block fillers and primers. Identify paint system on back of control Samples.
3. For transparent finishes, prepare the samples on wood specie, which will be used for the Project; 12-inch for lumber; 12-inch square for veneered panels.
4. Resubmit until required sheen, color, and texture are achieved.

C. Data: Manufacturer product data as follows.

1. Data for paint products, including paint label analysis, application instruction, and VOC content in grams/liter.

1.5 QUALITY ASSURANCE

A. Painter’s qualifications: Firm and individuals experienced in applying paints and coatings similar in material, design, and extent to those specified for the Project, whose work has resulted in applications with a record of successful in-service performance.
B. SCAQMD Rule 1113: Submit paint manufacturer's certificate stating that provided coatings meet or exceed current SCAQMD Rule 1113 requirements.
C. Mockups:

1. Apply sample paint finishes (approximately 10-foot square) of each color scheme to wall areas, as directed by the Architect.
2. Obtain Architect's approval of mockups before proceeding further. Approved mockups will be used as a standard for the Project, and if properly identified may remain a part of the Work.
3. Final acceptance of colors will be from job-applied samples.

1.6 JOB CONDITIONS

A. Environmental requirements:

1. Comply with paint manufacturer’s recommendations for environmental conditions and the following.
2. Provide adequate heating and ventilating to maintain environmental conditions recommended by paint manufacturer.
3. Do not apply finish in areas where dust is being generated.
4. Apply paint under the following prevailing conditions.
    a. Air and surface temperatures are not below 40-degree F. or above 120-degree F.
    b. Surface temperature is at least 5-degree F. above the dew point.
    c. When there is not threat of impending rain.

B. Protection:

1. Protect adjacent whether being painted or not against damage from painting operation. Correct damage by cleaning, repairing, replacing, and repainting, as approved by Architect, and leave in an undamaged condition.
2. Use protective methods and materials, including temporary covering, recommended in writing by deferred (finish) flooring manufacturer.
3. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work. Post signs immediately after painting.
4. Provide drop cloths, shields, barricades and other protection necessary to safeguard adjacent surfaces not to be painted.
5. Provide and maintain protection as required to protect finished work from damage until its acceptance.

C. Illuminate work area during painting to provide the same or greater level of illumination required to properly perform the work and will occur in the room or space after the building is in operation.

1.7 HANDLING

A. Store materials indoors and mix only in spaces suitable for such purpose. Protect adjacent surfaces when mixing.
B. Store paint containers so the manufacturer's labels are clearly visible.

1.8 WARRANTY

A. Color of exterior surfaces painted, as part of the work of this Section shall, at the end of one year, have remained free from serious fading when compared to a control sample of the original paint.
B. Interior and exterior paint shall have its original adherence at the end of one year and there shall be no evidence of blisters, running, peeling, scaling, chalking, streaks, or stains at the end of this period.
C. Washing painted surfaces with alkali-free soap and water shall remove surface dirt from painted surfaces without producing deteriorating effects.

1.9 MAINTENANCE MATERIAL

A. With closeout submittals deliver one identified unopened gallon of each type and color of paint material used on the Project to the Owner for future paint touchup.
B. In addition to manufacturer label, identify with room number, floor or area, type of paint, color and sheen, as applicable, for future identification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified and approved manufacturers:

1. Catalog names and numbers refer to products manufactured or distributed by the Vista Paint Corp. Dunn Edwards Corp., and Sherwin Williams except as otherwise specified.
2. Equivalent acceptable products by Benjamin Moore, PPG and Behr may be substituted when approved by the Architect.

2.2 PAINT

A. General:

1. Provide coating systems meeting or exceeding current SCAQMD Rule 1113 requirements.
2. Biocide content shall not exceed 0.025 percent by weight or volume.
3. Paint shall not contain fungicides or bactericides classified as mercury acetates, phenol phenates, or phenol formaldehyde.
4. Water-based paints shall not be formulated or manufactured with chemicals listed by Green Seal to be hazardous including, but not limited to, formaldehyde, halogenated solvents, aromatic hydrocarbons, mercury, and mercury compounds.
5. Paints shall not be tinted with pigments of lead, cadmium, chromium, and their oxides.

B. Quality and manufacture: Insofar as practicable, each paint shall be factory-mixed to match approved samples and colors, and be of a consistency permitting immediate application. Use best quality grade regularly manufactured by one of the manufacturers listed in the schedule at the end of the Section.

C. Paint uniformity and compatibility:

1. Provide finish coats compatible with the prime coats used.
    a. Review other Sections of these Specifications, in which prime coats are specified, and manufacturer data for shop-primed surfaces to be painted.
    b. Be responsible for the compatibility of the total coating system.
2. Provide barrier coats over incompatible primer or remove and reprime.
3. Products of more than one approved manufacturer may be used, except that all products applied on a surface shall be by the same manufacturer.

2.3 MISCELLANEOUS MATERIALS

A. Joint sealant: Paintable sealant as specified in Section 07 92 00.
B. Galvanized etching product: One of the following.

1. Jasco Prep N Prime.
2. Oakite 747 LTS.
3. Henkel Galvaprep 5.

2.4 COLOR SCHEDULE

A. Refer to the Finish Schedule on Drawings for paint colors.
B. The Architect may select, allocate, and vary colors and sheens on different surfaces throughout the Work, subject to the following:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be painted for conditions that would adversely affect the permanence and quality of this work.
B. Correct unsuitable conditions before proceeding with painting.

3.2 SURFACE PREPARATION

A. General: Prepare surfaces to receive the specified finishes in compliance with the paint manufacturer’s instructions and the following. Extend painting on all surfaces visible from any angle.
B. Galvanized steel: Comply with American Galvanizers Association recommendations, ASTM D 2092, ASTM D 6386 - 10 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting, and the following.

1. Clean with commercial phosphoric acid solution or one of the products named above for pretreatment or by brush off blast cleaning with a fine abrasive to achieve a uniform anchor profile of 1.5 to 2 mils.
2. Recoat within the time limit recommended by the primer manufacturer.

C. Shop-primed metal: Remove oil, grease, dirt and foreign matter. Spot prime abraded surfaces with compatible primer.
D. Shop-painted metal: Sand to provide a mechanical bond with field applied finishes, or use a commercial preparation specifically formulated to improve paint bond.
E. Unprimed ferrous metal: Remove rust, mill scale, oil and other foreign matter.
F. Aluminum: Remove foreign matters and clean with mineral spirit.
G. Factory-primed equipment: Repair damaged primer; remove rust and clean to bright metal where appropriate. Sand or etch primer to permit bonding of finish coats. Clean surfaces thoroughly before applying additional coats.
H. Plaster, concrete and CMU:

1. Clean surfaces of dirt, laitance, encrustations and foreign matter. For concrete, comply with SSPC-SP13, “Surface Preparation of Concrete.”
2. In plaster and concrete, patch cracks, holes, pits and other imperfections, not patched under other Sections, flush and smooth with adjacent surfaces.
3. Do not apply sealer or paint when the moisture content of the surfaces to be painted exceeds 8 percent.
4. Touchup suction spots after priming with an additional prime coat until all surfaces show a uniform coating.

I. Gypsum board:

1. Remove dust, loose particles or other matter that would prevent proper paint adhesion.
2. Check to see that joints and screw heads are properly covered with joint compound and sanded smooth and flush with adjacent surfaces.

J. Wood:

1. Sandpaper smooth and dust clean. Remove handling marks and raised grain.
2. Fill nail holes, cracks and depressions with wood filler , colored to match finish for wood scheduled to receive a transparent finish. Use a tack cloth on wood to receive a transparent finish to remove sanding dust.

K. Other materials not covered above: Prepare to receive paint in compliance with the paint manufacturer instructions.

L. Existing painted surfaces:

1. General:
    a. Wash surfaces with biodegradable detergent to remove dirt, dust and contaminants. Rinse clean. Use bleach on mildew; remove mildew completely.
    b. Patch dents, gouges and other imperfections in painted surfaces and sand smooth and flush with adjacent undamaged surfaces so that patching will be invisible after painting.
    c. Remove dust, rust and other surface contaminates, loose and unsound paint coatings, etc. as required to provide clean and sound surfaces to receive new paint.
    d. Remove gloss from enamel paints with steel wool or by treating them with a commercial de-glosser used in compliance with its manufacturer's instructions.
    e. Where paint is missing, damaged, or dented and where bare substrate is exposed, remove all surfaces contamination and featheredge all edges to zero. Sand surfaces smooth and prime.
    f. Additionally, paint that is loose or is not otherwise tightly adhered to the substrate must be removed back to sound paint and down to the substrate, and all edges feathered to zero. When 40 percent or more of the paint on a given substrate is loose, damaged, or otherwise unsound, all the paint down to the substrate must be removed.

2. Wood:
    a. Verify that substrate is smooth and free of dirt, oil, and other foreign substances, while knots shall be seasoned, clean, dry, and sealed.
    b. Holes and imperfections must be filled with putty or plastic wood filler and sanded smooth, with the edges, ends, faces, undersides, and backsides primed.
    c. There shall be neither signs of steel wool (used for smoothing) nor blue stain.

3. Galvanized surfaces:
    a. Clean of soil, cement spatter, weld flux and spatter, oil grease, grime, and other surface dirt.
    b. Additionally, repair damaged zinc coating on galvanized surfaces with high zinc content cold-galvanizing repair.
    c. Remove grease, oil, dust, grime, and loose dirt are removed;

d. Abrade surfaces sufficiently and roughen to provide a sound-anchoring base for new paint.

4. Rust: Remove down to bright metal and prime surfaces with rust-inhibitive primer.
5. Test: Test a small area of the previously painted finish with the new coating by applying to specified thickness and then continuing the test for the manufacturer's recommended published length of time before re-coating. If the previously painted surface blisters, wrinkles, dissolves, and/or delaminates, it will not work with the new finish. Where the previously painted surface is incompatible with the finish coat, one should apply a proper barrier coat to the prime coat. It is important to allow the manufacturer's suggested drying time between the succeeding coat, and to check the film of the previous coat be certain it is cured.

M. Hardware:

1. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be painted, or provide surface- applied protection prior to surface preparation and painting.
2. Coat cutouts for hinges, edges of lockset holes and same as for first coat.
3. Following completion of painting each space or area, reinstall the removed item by workmen skilled in the trades involved.

N. Fire extinguishers and fire hose cabinets: Apply 2 coats of paint finish, inside and out, matching finish and color of adjoining areas, unless otherwise noted for directed.
O. Weatherstripping and sound seals. Paint exposed metal surfaces to match the door frame, whether or not unfinished, furnished with factory prime coat, or factory treated for paint adhesion.
P. Access doors and panels: Generally, paint the same color as surrounding walls and ceiling.
Q. Registers: Paint exterior of register same color as adjacent wall. Paint interior of connected duct flat black for a distance of 18 inches.

3.3 PAINT PREPARATION

A. Open paint containers only as required for use. Mix paint in designated areas.
B. Thoroughly stir and agitate paint to uniformly smooth consistency suitable for proper application.
C. Do not reduce, change or use any materials except in compliance with manufacturer printed instructions.
D. In all cases, prepare and handle paint to prevent deterioration and inclusion of foreign matter.

3.4 APPLICATION

A. General:

1. Seal interior joints between wood or wood composite materials, trim, baseboard, molding, and casements and adjacent materials with paintable sealant specified in Section 07 92 00.
2. On prefinished wood doors, finish bottom after trimming and cutouts with 2 coats of high solids clear urethane varnish promptly upon delivery to the jobsite. This requirement applies also to plastic laminate faced doors.
3. Where the 2 faces of doors differ in color or finish, finish the edges to match the face visible when the door is open.
4. Apply paint only under conditions that will insure finishes free from blemishes and defects. Leave corners with no undue amount of paint buildup.

5. Use a slightly different shade for each coat of paint so that it may be readily identified.
6. Primer and intermediate coats shall be unscarred and completely integral when succeeding coats are applied. Sand and dust between each coat to remove defects visible from a distance of 5 feet.
7. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
8. Remove paint spillage and spatters on adjacent surfaces so as not to damage the surface being cleaned.
    a. Perform patching and repairs required because of painting operations.
    b. Refinish entire panel or assembly where portion of finish has been damaged or is not acceptable to the Architect.
9. Paint interior surfaces of ducts, where visible thru registers and grilles, with a flat nonspecular black paint.
10. Unless otherwise directed by the Architect, spray-paint exposed surfaces of ceiling diffusers, air return grilles, speakers and other electrical and mechanical items, except smoke detectors and sprinkler heads, in painted ceilings to match the ceilings, whether these items are primed or factory-finished.
11. Number of coats:
    a. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried.
    b. The number of coats specified is the minimum required for complete coverage and uniformity of color.
    c. Apply additional coats when undercoats, stains, or other conditions show through the final finish until the finish is of uniform color and appearance.
12. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
13. Paint interior surfaces, which are a continuation of exterior surfaces, subject to exterior exposure (such as an out-swinging door), with the applicable exterior coating system.
14. For opaque finishes, Completely cover surfaces to be painted to provide an opaque, smooth surface film uniform in finish, color, appearance, and coverage. Painted surfaces with cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness and other imperfections are not acceptable. Cut paint in sharp lines and color breaks.
15. For transparent finishes, apply multiple coats to produce a glass-smooth surface film of even luster, free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, and other surface imperfections.
16. Completed work shall match approved samples, as determined by the Architect. Remove, refinish, or repaint work not complying with specified requirements.

B. Labeling rated (fire and smoke walls and partitions): Identify both sides of rated walls and partitions above finished and decorative ceilings (plenum) with minimum 2-inch high, bright red letters spaced at 10 feet o.c. maximum, as follows. Identification can be painted using a stencil or by using pre-printed self-adhesive labels.

1. Fire rated partitions: "FIRE PARTITION - DO NOT PENETRATE."
2. Smoke barrier partitions: "SMOKE PARTITION - DO NOT PENETRATE."

C. Painting fire suppression, plumbing, HVAC, electrical, communication, and electronic safety and security work: Paint the following and their hangers and accessories where exposed to view:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Ductwork.
5. Metal conduit.
6. Plastic conduit.
7. Tanks that do not have factory-applied final finishes.

D. Application method: Contractor's option provided applied coatings match approved samples. The Architect reserves the right to require that paint be sprayed for smoothness and uniformity.

E. Priming:

1. Prime bare metal scheduled to be painted, and not embedded in concrete and masonry, immediately upon delivery to the site.
2. Time lapse between priming and application of second coat shall be as short as possible.

F. Shop-primed metal:

1. Apply 2 finish coats of paint to match adjoining surfaces, as directed by the Architect, to shop primed mechanical and electrical equipment. This work includes but is not limited to interior of fire hose cabinets, air grilles, ceiling diffusers, electrical and telephone panels, and access panels.
2. Paint conduits, outlets and pull boxes, and mechanical equipment exposed to view, such as covered and uncovered piping and ductwork, pumps, compressors, air conditioning equipment and tanks as specified in this Section.
3. Paint the back side of access panels, removable or hinged covers to match the exposed surfaces.

G. Miscellaneous painting: Surfaces to be painted and not specifically described herein, shall be painted with a product specifically manufactured or prepared for the material and surface to be painted with a prime and 2 finish coats.

3.5 TOUCHUP/CLEANING

A. At completion of construction activities of other trades, touchup and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

DIVISION 10
SPECIALTIES

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SECTION 10 11 17 – GLASSBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass surfaces to accommodate graphics, signage artwork and dry-erase markers.
2. Accessories as indicated and required to provide a fully functional installation.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing: Schedule shop drawings after rough dimensions are established for determination of actual size of glassboards.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data for boards, including cleaning recommendations.
B. Shop Drawings: Include elevation of each wall, proposed joint locations (subject to relocation by the Architect at no cost to the University), and section thru trim members.
C. Samples:

1. Glasboard surface, not less than 24-inch square.
2. Twelve-inch length of each linear item.
3. Copy of manufacturer’s warranty.

1.4 QUALITY ASSURANCE

A. Installer qualifications: Skilled commercial installer with no less than 3 years of documented experience installing similar types of display boards and extent required.

1.5 HANDLING

A. Follow manufacturer’s recommendations.
B. Keep away from damage.

1.6 PROJECT CONDITIONS

A. Take field measurements prior to preparation of Shop Drawings and fabrication to ensure proper fitting.
B. Show recorded measurements on final Shop Drawings.

1.7 SPECIAL WARRANTY

A. Furnish the Owner the manufacturer's 5-year warranty, agreeing to replace marker boards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking, provided the manufacturer's instructions with regard to handling, installation, protection, and maintenance have been followed.

PART 2 - PRODUCTS

2.1 GLASSBOARD

A. Manufacturer/model: Clarus Glass by Clarus, or equal.
B. Board construction:

1. 1/4-inch Clarus tempered safety glass.
2. Non-staining writing surface. Compatible with any marker, even permanent markers.
3. Clarus Opti-Clear finish and eased corners for safety.
4. Starphire (gloss) finish.
5. Designed to accommodate up to 1/4-inch-thick graphic inserts.

2.2 FABRICATION

A. Clean look with no trim or visible hardware.
B. 1-in mounting standoffs (Float).
C. Glass face sits 1” off wall.

2.3 FINISH

A. Colordrop Print Technology: To Be Determined.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

A. Remove ridges and fill-in gouges and low points in substrate. Float surface so that finished surface is smooth (glass like) and contacts a 10-foot straightedge with no more that 1/16-inch deviation.
B. Prime and/or seal substrate when recommended by the adhesive manufacturer.

3.3 INSTALLATION

A. Install glassboards in compliance with their manufacturer's instructions, and the Drawings.
B. Adhere securely to substrate, plumb, level and square with no joints in the marker boards.
C. Locate and secure accessories.
D. Touchup minor damage, when the results are acceptable to the Architect, or replace damaged parts.

END OF SECTION

SECTION 10 14 00 – SIGNAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior signs: Building-mounted cast aluminum letters.
B. Interior Signs:

1. Room and door signs.
2. Building identification signs.
3. Code-compliance signs at exits and toilet rooms.
4. Exit signs, unlighted.

1.2 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
C. Samples:

1. Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment. Include the letters “C’ and “N” in cast steel letters with paint.
2. Exposed Accessories: Full-size Sample of each accessory type.

D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
E. Verification Samples: Submit samples showing colors specified.
F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Uniformity: For each sign form and graphic image process indicated furnish products of a single manufacturer.
C. Coordination: Before starting Shop Drawings, notify the Architect and arrange a meeting with the Owner's designated personnel to review in detail the work of this Section. Review and coordinate layouts for each sign, and obtain Architect's approval prior to manufacture.
D. All tactile room identification and exit signs shall include Grade 2 Braille translation with the tactile portion of the sign following the requirements of ADA.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.
C. Store tape adhesive at normal room temperature.

1.5 FIELD CONDITIONS

A. Verify type of supporting construction; provide suitable attachments.
B. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
C. Maintain this minimum temperature during and after installation of signs.
D. Adhesive as the sole means of installation is only allowed where sign is to be on glazing.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Comply with University's "General Room Numbering Guidelines".
B. Signage shall conform to the CBC and specifically to the following CBC chapters:

1. Chapter 11B-201.1 for design and construction, 11B-603 and 11B-604.8 for passageways.
2. Chapter 11B-216.6 for scoping for signs where accessible routes diverge from the regular circulation path
3. Chapter 11B-703 for non-accessible existing entrances and general standards.
4. Chapter 11B-703.7.2.6: Stroke thickness shall be 15 percent maximum.
5. Chapter 11B-703.3 for braille requirements.
6. Chapter 11B-703.5.1, 6.2 and 7.3 for finish and contrast.
7. Chapter 11B-703.2.4 and 2.6 for proportions.
8. Chapter 11B-307.3 for pole-mounted objects, edges and corners.

C. Characters:

1. Comply with CBC 11B-703.5 for visual characters.
2. Character Type: Characters on signs shall be raised 1/32 inch minimum and shall be sans serif uppercase characters accompanied by contracted Grade 2 Braille (see Note 5 below).
3. Character Size: Raised characters shall be a minimum of 5/8 inch and a maximum of 2 inch high.
4. Finish and Contrast: Contrast between characters, symbols and their background must be 70% minimum and have a non-glare finish.
5. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10.
6. Letters measured must be uppercase. After choosing a typestyle to test, begin by printing the letters I, X, and O at 1 inch height. Place the template's 1:1 square over the X or O, whichever is narrower. If the character is not wider that 1 inch, nor narrower than the 3:5 rectangle, the proportions are correct. Use the 1:5 rectangle to determine if the stroke of the I is too broad, and the 1:10 rectangle to see if it is to narrow. If all the tests are passed, the typestyle is complaint with proportion code.

D. Braille Symbols:

1. Comply with CBC Section 11B-703.3.
2. Contracted Grade 2 Braille shall be used whenever Braille is required in other portions of these standards. Dots shall be spaced 1/10 inch on center in each cell, with 2/10 inch space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch above background

3. Provide rounded or domed Contracted Grade 2 Braille dots, each distinct and separate. Dots with straight sides and flat tops are not acceptable.

E. Type Imagery:

1. Type style: Sans Serif upper case.

   a. Letter Size: See signage drawings.
   b. Number Size: See signage drawings.
   c. Raised Letters: Letters shall be raised a minimum of 1/32 inch above background.
   d. Other Sizes: As specifically indicated.

2. Arrangement: Use standard spacing between letters, words, numbers and lines; center text.
3. Symbol Style: Recognized standard International Symbols of Accessibility, such as those developed by the American Institute of Graphics, for the U. S. Department of Transportation.

   a. Accessible Restrooms shall include a 6 inch high wheelchair logo. Logo shall be raised a minimum of 1/32 inch above the background.
   b. On visual signs, characters and symbols shall be sized according – to view distance. Signs mounted 80 inch or more AFF shall have minimum 3 inch high characters.
   c. Pictographs and ISA's (International Symbol of Accessibility) on interior signs at eye level, shall be minimum 3-inch-high or twice as high as the height of text on the sign; whichever is greater. On signs where bottom is 72 inch or more AFF, minimum height shall be 6 inch or twice as high as the largest text on the signs; whichever is greater.

4. Colors:

   a. Background Colors: As selected by the Architect from manufacturer's standard color range (12 colors maximum); one color maximum, typically.
   b. Type Imagery: White or black, as selected by Architect to contrast with background colors; one color maximum, each, for interiors and exteriors.
   c. Code Required Colors for Symbols and Signs: Where colors are mandated by Codes or Regulations conform to their requirements including 11B-703; colors from the CBC.
   d. Other colors: Certain colors are specifically noted.

F. Exterior Building Mounted Signage:

1. Font: Futura Medium.
2. Material: Aluminum letters with a clear-coat finish.
3. Finish: Vertical brush grain and be fully backed to prevent debris and insect nesting.
4. Height: 12-inches.
5. Depth: +/-1.5” and designed to standoff from building approx. 1/8”.

2.2 MANUFACTURERS

A. Exterior building mounted signage:

1. Gemini Incorporated.
2. Impact Architectural Signs.
3. CCSW / National Signage Affiliates.
4. Or equal.

B. Interior & parking signage:

1. Advance Corporation; Braille-Tac Division.
2. ASI.
3. Architectural Graphics, Inc.
4. Architectural Signs and Directories.
5. Vomar Products, Inc.
6. Or equal.

2.3 SIGNAGE APPLICATIONS

A. Accessibility Compliance: All signs are required to comply with ADAAG and CBC Chapter 11B and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
B. All Signage Types: Unless otherwise indicated:

1. Character Font: Helvetica, or other sans serif font acceptable to the Architect.
2. Character Case: Upper case only.
3. Background Color: Clear.
4. Character Color: Contrasting color.

C. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.

1. Sign Type: Flat signs with engraved panel media as specified.
2. Provide “tactile" signage, see above.
3. Braille shall be rounded or contracted domed top.
4. Character Height: 1 inch.
5. Sign Height: 2 inches, unless otherwise indicated.
6. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings.
7. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings.
8. Service Rooms: Identify with the room names and numbers shown on the drawings.

2.4 PLASTIC SIGN MATERIAL

A. Material:

1. Type: Phenolic Resin Core with a three-ply melamine resin surface.
2. Thickness: 1/8 inch.

B. Adhesive: Pressure sensitive, hi-tack transfer tape with peel-back paper backing. Structural grade silicone adhesive for mounting on glazing.
C. Mounting Screws: Non-corrosive, tamperproof screws. Match finishes to the door hardware for the door where the signs are mounted.
D. Signs shall be non-static, fire retardant, and self-extinguishing.
E. No. SP125 Manufacturing Specifications per basis of design manufacturer:

1. Material thickness: 1/8 inch.
2. Standard sheet size: 48 inch x 96 inch.
3. Weight: 1/8 inch = 1 lb/ square foot.
4. Maximum continuous operating temperature: 225°F.
5. Flexural strength flat: 21,497 psi.
6. Tensile strength: 22,000 psi.

7. Shear strength: 22,729 psi.
8. NEMA rated "self-extinguishing"

2.5 SIGN TYPES

A. Graphic Process and Fabrication: All signs shall be manufactured using "Sand-Etched Process" or equivalent system, as per acceptable manufacturers stated methods, whereby characters are integral part of signage body.

1. Tactile characters shall be raised the required 1/32 inch from sign face. Glue-on letters, images and/or symbols are not acceptable.
2. Work to have sharp clean profiles.
3. Text shall be accompanied by Contracted Grade 2 Braille. Braille shall be separated 1/2 inch from corresponding raised characters or symbols.
4. Perimeter borders shall be 1/4 inch minimum.
5. Edges: Finish edges smooth and clean, without chips or burrs.
6. Corners: Provide radius corners; 1/8 inch diameter.
7. Cut-outs For Hardware: Factory made, accurately, to templates.
8. Mounting Holes: Factory drilled.
9. Adhesive Backing: Completely cover rear surface of each sign.

B. Room Identification Signs:

1. Refer to Drawings for names, numbers, identification symbols, sizes, configurations, and locations.
2. Colors for Type Imagery:
    a. Room Name Signs:
        1) Type: Black or white, to be selected by Architect.
        2) Background: One color to be selected by the Architect from manufacturer's standard color range (12 colors, minimum) for interior signs, unless otherwise noted. Refer to signage schedule.
    b. Room Number Signs:
        1) Type: Black or white, to be selected by Architect.
        2) Background: One color to be selected by the Architect from manufacturer's standard color range (12 colors, minimum) for interior signs, unless otherwise noted. Refer to signage schedule.
        3) Architect shall select a second color for signs located on exterior.

C. Accessibility Symbol Signs:

1. Refer to Drawings for identification symbols, sizes, configuration, and locations.
2. Figure Symbols for Building Entrance Signs:
    a. Size: 6 inch x 6 inch, typically.
    b. Refer to Drawings.
3. Geometric Symbols for Toilet Rooms: Comply with CBC 11B-703.2.6.
    a. For Men/Boys: An equilateral triangle, 12 inch on a side; 1/4 inch thick.
    b. For Women/Girls: A 12 inch diameter circle; 1/4 inch thick.
    c. For Both Sexes: The combined circle and triangle symbol shall consist of a circle symbol 1/4 inch thick and 12 inches in diameter with a 1/4 inch thick equilateral triangle symbol superimposed.

4. Directional Signs.
5. International Symbol for Access for the hearing impaired.
6. Colors for Symbols:

   a. International Accessibility Symbols:

      1) Symbols: White.
      2) Background: Blue, Color No. 15090 per Federal Standard 595C.

   b. Male and Female Symbols:

      1) Symbols: Blue.
      2) Background: White.

D. Room Capacity Signs:

1. Wording for sign at Assembly Room at Multi-Purpose Building: See Plans and Signage drawings. Number to be on Drawings or provided by Architect.
2. Refer to Drawings for identification.

E. Exit Signs; Floor Level, Self-Luminous:

1. General:

   a. Conform to State Fire Marshal, Title 19.
   b. UL listed 924 Floor-level exit signs.
   c. UL listed 1994 floor-level exit markers and exit path marking.
   d. ICBO No. ERS-5101.

2. Refer to Drawings for identification, symbols, sizes, configuration, and location.
3. Mounting Locations: Single-face for flat-to-wall mounting.
4. Acceptable Manufacturer and Product: Active Safety; Murray, Utah; 800-657-6324; Model #16.000 SWMA stencil-faced Exit Marker, or equal.

F. Exterior Building Mounted Signage: See 2.01 above.

1. Characters with uniform faces, sharp corners, and precisely formed lines and profiles.
2. Finish: Dark Medium anodized to match aluminum glazing assemblies.

2.6 FABRICATION-BUILDING MOUNTED SIGNAGE

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.

6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with finish to match letters color unless otherwise indicated.

2.7 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

1. Exterior: Stainless steel, galvanized steel.
2. Interior: Bright finish.

B. Tape Adhesive: Double sided tape, permanent adhesive.

1. Completely cover the plate with adhesive.

C. Where flat signs are mounted on glass walls:

1. Provide an additional blank plate with same background color.
2. Mount this plate on the inside of glass in alignment with sign plate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 PREPARATION

A. Layout: Accurately lay out work to maintain proper lines, levels and spacing.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and CBC Chapter 11B.
B. Install neatly, with horizontal edges level.
C. Mounting location shall be determined so that a person may approach within 3 inches of signage without encountering protruding objects or standing within the swing of the door. CBC Section 11B-703.4.2.
D. Mounting:

1. See drawings for locations.

2. Press tape firmly to mounting surface, and secure each plaque or sign with minimum four tamper-proof screws for square or rectangular signs; minimum three tamper-proof screws for triangle, or round signs.
3. Signs shall have pre-drilled holes when delivered, and mounted with non-corroding anchors and tamper-proof screws.
4. When mounting on glazing, press silicone adhesive firmly to glazing. Clean excess adhesive from glazing.

E. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

SECTION 10 21 13 - STAINLESS STEEL TOILET COMPARTMENTS & SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes floor-mounted, overhead-braced stainless steel toilet compartments.
B. Related requirements: Section 10 28 13 for toilet room accessories.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data for the work of this Section supplemented by Shop Drawings showing plan layout, attachment to adjacent construction and other details not shown on the Manufacturer Data.
B. Shop Drawings:

1. Show layout of compartments and screens in each space to receive them.
2. Show elevations.
3. Show fabrication and erection of compartment assemblies, to extent not fully described by manufacturer’s data sheets.
4. Show anchorage, accessory items and finishes.
5. Provide location drawings for bolt hole locations in supporting members for attachment of compartments.

C. Samples:

1. Panel Samples, approximately 6-inch square, showing core and edge construction, face panels, and edges, all with the selected finish.
2. Full size Samples of hardware when requested.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years experience in the manufacture of toilet compartments.
B. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum 3 years.
C. Source Limitations: Obtain toilet compartment components and accessories from single manufacturer.
D. Accessibility Requirements: Comply with requirements of ICC/ANSI 117.1, and with requirements of authorities having jurisdiction.
E. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 0.
2. Smoke-Developed Index: 0.

1.4 HANDLING

A. Protection: Cover stainless steel components, after fabrication, with electrostatically-applied plastic film.
B. Storage: Undercover, off the ground or floor, in a dry, ventilated space out of harm's way.

1. Store panels upright.

1.5 MAINTENANCE

A. With closeout submittal, provide instructions for proper care of compartments and screens, such as lubrications, adjustments, and cleaning.

1.6 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:

1. Stainless Toilet Partitions: Against rust-out: 15 years.
2. Stainless Steel Hardware: Lifetime.

PART 2 - PRODUCTS

2.1 MANUFACTURE/TYPE

A. One of the following, or equal:

MANUFACTURER	COMPARTMENTS
Sanymetal (basis of design)	Academy Sanystainless
Flush Metal Corp.	Flushite H/B
General Partitions Mfg. Corp.	40 Series H/B
Metpar	Corinthian

2.2 MATERIALS

A. Face plates:

1. Stretcher-leveled, cold-rolled for doors pilasters and panel faces, smooth for edging, AISI Type 302/304 stainless steel.
2. Metal thicknesses:

a. Doors: 22-gage.
b. Partitions: 22gage.
c. Stiles or pilasters: 20-gage.
d. Door and partition edge locking strips: 20-gage.
e. Stile or pilaster shoe trim: 20-gage.

B. Reinforcement:

1. For tapping: 14-gage.
2. For anchoring: 12-gage.

C. Sound-deadening core: Bridgecore.
D. Head rail: Aluminum extrusion standard with the manufacturer, and finished with a satin, clear anodized coating.
E. Minimum section thicknesses:

1. Doors and partitions: One inch.
2. Pilasters and stiles: 1-1/4-inch.

F. Hardware: The door shall be adjustable to permit rest position at any angle within a 270-degree arc; the weight at all times shall be carried by a power bearing with moving parts concealed within the door thickness.

1. General: Manufacturer standard material and finish, as follows.
2. Hinges: Top hinge pin shall be secured at 3 points with chrome-plated doors hinge fittings flush with face plates of the door.
3. Coat hook/bumper: Each door shall be equipped with chrome-plated cast alloy coat hook and bumper, concealed latch #8800 with bolt of stainless steel permitting exterior access, a one piece chrome-plated stop and keeper and #7961 concealed controlled power bearing gravity hinge.

G. Hinges: 54-inch 16-gage stainless steel continuous cam hinge.
H. Headrail: Extruded 6463-T5 alloy aluminum with anti-grip design.
I. Headrail brackets: 20-gage stainless steel with satin finish.

1. Floor and ceiling connections: Concealed with a one piece 304 stainless steel theftproof plinth.
2. Stirrup brackets: Chrome-plated Zamac used to attach panels and pilasters.
3. Fasteners: Theft-resistant (one-way) stainless steel fasteners for attachment of exposed hardware, component connections and compartments to walls; finished to match the hardware and fittings.

2.3 FABRICATION

A. Fabricate components straight, clean cut and free from defective workmanship and materials.
B. Assemble doors, panels and pilasters from 2 face sheets with integrally interlocked edges, or form edges by assembling and cementing under pressure to core; bind formed edges with lock strips.
C. Miter corners of edge moldings, weld and grind smooth and flush with adjacent surfaces.
D. Provide concealed reinforcement for tapping, or rivet nuts where machine screws are required for fastening; do not use thru-bolts unless acceptable to the Architect..
E. Provide cutouts and reinforcement in toilet compartments as required for installation of accessories specified in Section 10 28 00. Make cutouts plumb, level and square; verify size of accessories before making cutouts so that the accessory flanges will conceal all raw edges.
F. Finishing:

1. Exposed surfaces: NAAMM No. 4 finish with the grain (belting) running the long dimension of the component. Match approved samples.
2. Exposed hardware and fittings: US 26 polished chrome (complying with ASTM B 456, Type SC2), or AISI No. 8 (mirror) finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
B. Set compartments plumb, level, and space uniformly in compliance with their manufacturer's printed instructions and the following.
C. Secure pilasters with 2 leveling anchor bolts embedded in the floor. Level, plumb and tighten installation with devices furnished.
D. Hang doors and adjust so those bottoms of doors are level with bottom of pilasters when doors are closed.
E. Secure panels to walls with continuous stainless steel channels; do not use stirrup brackets.

1. Locate wall brackets so that holes for wall anchorages occur in tile joints.
2. Secure panels to pilasters with not less than 2 stirrup brackets located to align with stirrup brackets at wall.
3. Anchor panels to studs or backing plates; fastening components to walls with toggle bolts will not be allowed.

F. Install hardware as recommended by their manufacturer. Conceal evidence of drilling in finished work.

3.3 ADJUSTING/CLEANING

A. Adjust brackets to provide uniform clearances not exceeding the following dimensions:

1. Pilasters and walls: One inch.
2. Panels and walls: One inch.
3. Pilasters and panels: 1/2 inch.
4. Pilasters and doors: 3/16 inch.

B. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors [and doors in privacy screens] to return doors to fully closed position.

3.4 FIELD QUALITY CONTROL

A. Adjust hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30-degree from closed position when unlatched, except set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.
B. After completion of installation, remove plastic film, clean and polish exposed surfaces and touchup minor scratches.
C. Remove and replace components which cannot be satisfactorily touched-up in the field.

END OF SECTION

SECTION 10 28 00 - TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes toilet accessories, including unframed stainless-steel mirrors and hand dryers.
B. Related requirements:

1. Divisions 09 and 10 for cutouts, openings and recesses for installation of accessories.
2. Divisions 05, 09 and 10 for toilet room accessories supports.
3. Division 26 for electrical components.

1.2 COORDINATION

A. Coordinate locations of electric hand dryers with other toilet accessories to prevent interference with clearances required for access, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data, and illustrations, complete parts list, and installation requirements for each accessory specified.
B. Samples: Full size Samples of accessories, when requested. Samples will be returned to the Contractor.
C. Schedule: Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for the Project.
D. Certifications: See QUALITY ASSURANCE below.

1.4 QUALITY ASSURANCE

A. Basis of design is for accessories made by Bobrick Washroom Equipment, Inc. Other acceptable manufacturers include American Specialties, Inc. and Bradley Corp.
B. Compliance with CBC requirements for accessibility for accessories and their attachments is the Contractor's responsibility.
C. Hand Dryer Certifications:

1. ETL listed in accordance with UL 507.
2. Compliant with National Sanitation Foundation International (NSF) Protocol P335 "Hygienic Commercial Hand Dryers".

D. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 HANDLING

A. When possible, keep protective covers on accessories until their installation is complete, then remove at final cleanup.

1.6 MAINTENANCE

A. Furnish operating instructions and keys for equipment locks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS & MODELS

A. Bobrick, basis of design, except as listed in schedule. See Fixture Schedule on Drawings.
B. ASI Group.
C. Bradley Corp.
D. Or equal.

2.2 MATERIALS

A. Stainless steel: AAMA Type 302/304 complying with ASTM A 167.
B. Sheet steel:

1. Cold-rolled commercial quality, complying with ASTM A 336, 20 gauge minimum.
2. Galvanized steel: ASTM A 653 LQ, G60 zinc coating, 20 gauge minimum.

C. Mounting devices: stainless-steel.
D. Fasteners: Spanner head design stainless steel fasteners where exposed; may be galvanized steel where concealed.

2.3 FABRICATION

A. Fabricate units with seamless one-piece flanges on exposed faces.

1. Miter corners, weld and grind smooth and flush with parent metal so that welds are invisible on exposed surfaces.
2. Open joints (not fully welded) on exposed surfaces are not acceptable.
3. Conceal anchoring devices.

B. Hang doors or panels on continuous stainless-steel piano hinges.
C. Master-key locked dispensing units. Key coin boxes of coin-operated dispensing units separately from the lock on the unit.
D. Grind edges smooth, both inside and out.
E. Finish exposed surfaces with an AISI No. 4 finish running in the same direction (horizontal or vertical) for all accessories, except where a knurled surface is specified for grab bars.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that attachment surfaces are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Drill holes to correct size and location. Install accessories plumb, level and equally spaced (where applicable).

1. Where accessories are attached to toilet compartments, do not “thru-bolt” but drill and tap partition reinforcement
2. Provide templates of accessories for drilling and tapping required in Section 10 21 13.

B. When installed in ceramic tile surfaces, coordinate accessory location with the tilework so that the top and one side (closest to the door) of the accessory will align with a tile joint.
C. Attach accessories plumb, level, evenly spaced where applicable, securely anchored with screws or bolts to steel studs or backing plates. Do not use Molly or toggle bolts in gypsum board.
D. Install grab bars to withstand a downward load of at least 250 lbf when tested according to method in ASTM F 446.
E. Adjust accessories for proper operation. After completion of installation, clean and polish exposed surfaces after removal of protective coverings.
F. Electric hand dryer:

1. Locate and install mounting bracket in accordance with manufacturer's written instructions. Use minimum 0.25-inch anchors to mount bracket. Mount electric hand dryer at height above finished floor recommended by manufacturer and drawings.
2. Install electric hand dryer in accordance with manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer. Install electric hand dryers level, plumb, and firmly anchored in locations and at heights indicated.

3.3 SCHEDULE OF ACCESSORIES

A. To be determined.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Fire extinguishers.
2. Fire extinguisher cabinets.
3. Mounting brackets.
4. Fire extinguisher locators.

B. Related requirements: Division 21 for fixed fire protection systems.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Coordinate size of fire extinguisher cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
2. Coordinate sizes and locations of fire extinguisher cabinets with wall depths. Final location of fire extinguisher cabinets is subject to the Fire Department’s approval.
    a. Verify cabinet locations with both the Fire Department and the Architect during the framing stage of the Project.
    b. Positioning of cabinets at locations other than indicated shall be done at no additional cost to the Owner.
    c. Where extinguisher Locations are not indicated, assume cabinet and extinguishers will be located within 75 feet of any point in the building, or at a rate of one for each 3,000 square feet of building area, or portion thereof, whichever yields the greater number of extinguishers.

1.3 SUBMITTALS

A. Data: Manufacturer Product Data and installation instructions for the work of this Section.

1. For fire extinguishers, submit Drawings indicating locations and type of extinguishers after approval by Fire Marshall.
2. For extinguisher cabinets, include roughing-in dimensions and details showing mounting methods, door hardware, cabinet type and materials, trim style and door construction, and materials.
3. Include color charts showing full range of manufacturer standard colors and designs available.

B. Closeout: 2 keys for each cabinet, all keyed alike, and properly tagged.

1.4 QUALITY ASSURANCE

A. Uniformity: Provide all fire extinguishers, cabinets and accessories made by one manufacturer.

B. UL listing: Provide UL listed fire extinguishers bearing the UL "Listing Mark" for type, rating, and classification specified. Provide cabinets with the same fire-rating as walls in which they are installed.
C. NFPA compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

1.5 SPECIAL WARRANTY

A. Fire extinguisher warranty:

1. Warranty stating that manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship for 5 years from Substantial Completion.
2. Failures include:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Products by Potter Roemer LLC.
B. Other acceptable manufacturers:

1. Potter Roemer.
2. Larsen’s Manufacturing Co.
3. Or equal.

2.2 FIRE EXTINGUISHERS

A. Multi-purpose dry chemical:

1. Amerex 5lb. ABC Extinguishers, basis of design.
2. Or equal.

B. Halon: 2A:40B:C UL-rated, 13 lb. capacity, chrome-plated brass valve.

1. Markings:
2. Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
3. Label with standard warnings concerning breathing, eyes, skin and ingestion. Provide emergency and first aid procedures.

2.3 FIRE EXTINGUISHER CABINETS

A. Semi-Recessed: Equal to Model No. 7012-B-VB by Potter Roemer.

1. Material: Steel.
2. Color: White
3. Size: 24-inches by 9-inches by 5-inches.
4. Projection: 2-inches.

B. Semi-Recessed, Fire-rated: Equal to Model No. FRC7012-B-VB by Potter Roemer.

1. Material: Steel.
2. Color: White
3. Size: 24-inches by 9 inches by 5-inches.
4. Projection: 3-1/2-inches.

C. Surface Mount: Equal to Model Number 7044-B-VB by Potter Roemer.

1. Material: Aluminum.
2. Color: White.
3. Size: 11.5-inches by 26.5-inches by 5.75-inches.
4. Projection: 6-inches.

2.4 ACCESSORIES

A. Fire extinguisher locators: White plastic. Red edge in white vinyl with a fire extinguisher symbol and “Fire Extinguisher” lettering by Flynn, or equal.
B. Mounting brackets (wall hooks):

1. Basis-of-design-products: Larsen’s Model B4, standard brackets of sizes required for extinguisher specified, in manufacturer standard plated finish.
2. Provide brackets for extinguishers, other than those in cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Verify with Fire Marshal and Architect each fire extinguisher cabinet location during the framing stage of the Project; location of fire extinguisher cabinets is subject to the Fire Marshal's approval.

1. Position cabinets at locations other than indicated at no cost to the Owner.
2. Where not indicated locate, cabinets and extinguishers with the Architect's approval, so that they can be reached within 75 feet travel distance from any point, or one for each 3,000 square feet, whichever is more restrictive.

B. Install cabinets so that the fire and/or acoustical rating of the walls are not compromised.
C. Attach mounting brackets and fire extinguisher cabinets securely to studs or backing plates, square, plumb and level, in compliance with their manufacturer's instructions; do not attach them to gypsum board with Molly or toggle bolts.
D. Install fire extinguisher locators where indicated. Secure to supports with double-sided foam tape.

3.3 FIELD QUALITY CONTROL

A. Verify that installed extinguishers are fully charged and tagged in accordance with requirements of authorities having jurisdiction.
B. Touchup damaged finish, when the results are acceptable to the Architect, otherwise replace damaged components.

END OF SECTION

SECTION 10 56 17 – ADJUSTABLE SHELVING HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Shelf standards, brackets, and accessories.
2. Miscellaneous wall brackets and accessories.

B. Related Requirements: Section 09 22 16 for strapping in wall cavities.

C. Work supplied by other sections and installed under this section: 06 41 16 for shelving.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Field verification: Verify actual locations of supports.

1.3 SUBMITTALS

A. 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.

B. Samples: Samples for each finish product specified. Include color/material specified here.

PART 2 - PRODUCTS

2.1 SHELVING SYSTEM

A. Manufacturers:

1. RAKKS, basis of design.
2. Or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's written instructions and shop drawings.

END OF SECTION

DIVISION 12
FURNISHINGS

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SECTION 12 36 61 – QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Quartz countertops and splashes.
2. Accessories and installation materials for countertops.

B. Related requirements: Division 06 for plywood underlayment.

1.2 SUBMITTALS

A. Data: Manufacturer product data, sample warranty form, fabrication and installation instructions.
B. Shop Drawings:

1. Indicate materials, fabrication details, field jointing, adjacent construction and methods of support and anchorages, and integration of plumbing components.
2. Show joint locations; locations is subject to the Architect’s relocation at no additional to the Owner.
3. Show position of openings required, with rough-in sizes. Provide templates for cast-in or placed frames or anchors; tolerances for item placement and temporary bracing of components.

C. Samples: 6-inch square samples for each countertop material representative of colors, textures and finishes to be expected for final product. Finish all exposed edges same as for exposed face.
D. Manufacturer's certificate: Certification that product meets or exceeds specified requirements for stain resistance.
E. Closeout:

1. List of approved cleaning materials and procedure required and provide list of substances that are harmful to countertop materials.
2. Include instructions for stain removal, surface and gloss restoration and scratch removal.

1.3 QUALITY ASSURANCE

A. Regulatory requirements: Conform to Code for flame/smoke rating in accordance with ASTM E 84.
B. Fabricator qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to those indicated for this Project and whose products have a record of successful in-service performance.
C. Installer qualifications: Fabricator of products.
D. Mockups:

1. Build one typical countertop for each material specified to demonstrate aesthetic effects and set quality standards for materials and execution.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 HANDLING

A. Packaging, shipping, handling and unloading:

1. Observe manufacturer recommendations and handle materials in manner to prevent breakage or damage. Brace parts if necessary. Transport in the near-vertical position with finished face toward finished face.
2. Do not allow finished surfaces to rub during shipping or handling.

B. Storage and protection:

1. Store in racks in near-vertical position.
2. Prevent warpage and breakage.
3. Store inside away from direct exposure to sun.
4. Store between 25 and 130 degrees F. Store with finished face towards finished face.
5. Use non-staining separators and non-staining waterproof covers.
6. Ventilate under covers to prevent condensation.

1.1 SPECIAL WARRANTY

A. Manufactured materials manufacturer shall warrant countertop materials against cracking, softening and discoloration for 10 years from Substantial Completion and shall correct defects or deficiencies which become apparent within warranty period to satisfaction of the Architect and at no expense to the Owner.

1.2 MAINTENANCE

A. Furnish list of approved cleaning materials and procedure required and provide list of substances that are harmful to each type of countertop material. Include instructions for stain removal, surface and gloss restoration and scratch removal.

PART 2 - PRODUCTS

2.1 COUNTERTOP MATERIALS/MANUFACTURERS

A. Quartz Surfacing: See Finish schedule.
B. Basis of Design: Caesarstone.
C. Or equal.

1. Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process.

2.2 MISCELLANEOUS MATERIALS

A. Adhesives: Manufacturers’ standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant: As specified in Section 07 92 00.

2.3 FABRICATION

A. Color match of each type of countertop material throughout Project shall be from the same batch with labels with same batch number. Visually inspect materials to be used for adjacent pieces to assure acceptable color match. Inspect under lighting conditions similar to those on Project.

1. Finish exposed surfaces smooth and polish to a low sheen.
2. Radius corners and edges unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Correct detrimental conditions before proceeding with installations.

3.2 INSTALLATION

A. Install countertops in compliance with the approved shop drawings, and their manufacturers' instructions, plumb, level, with tight, flush joints.
B. Anchor with adhesive securely to supports with a maximum variation from true dimension and position of 1/8-inch.
C. Fill space between countertops and walls with sealant; comply with the requirements of Section 07 92 00.

1. Tool sealant uniformly to form a cove and shed water.

D. Install countertops with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.
E. Align adjacent countertops and form seams to comply with their manufacturers' written recommendations using adhesives in colors to match countertop.
F. Form field joints using manufacturers' recommended adhesive, with joints inconspicuous in finished work.

3.3 CLEANING

A. Clean countertops after sealant has cured using clean water and stiff bristle brushes.
B. Clean and polish surfaces in compliance with each respective manufacturer's instructions not less than 6 days after completion of installations. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage countertops surfaces.
C. Remove and replace materials that are damaged, have been stained, that do not match adjacent countertops or cannot be satisfactorily cleaned or repaired, as determined and directed by the Architect, at no cost to the Owner.
D. Protect finished work from damage by covering with heavy Kraft paper until final cleaning.

END OF SECTION

SECTION 12 36 63 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL:

1.1 SUMMARY

A. The extent of solid polymer fabrications is shown on the Drawings and includes:

1. Counter tops.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
B. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
C. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
D. Samples: Submit minimum 2 inch by 2 inch samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.
E. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions and maintenance video. Provide maintenance kit for [matte][semi-gloss and gloss] finishes. Include in project close-out documents.

1.3 DELIVERY, STORAGE AND HANDLING:

A. Deliver no components to project site until areas are ready for installation. Store indoors.
B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.4 QUALITY ASSURANCE:

A. Allowable Tolerances:

1. Variation in component size: ±1/8 inch.
2. Location of openings: ±1/8 inch from indicated location.

1.5 WARRANTY:

A. Provide manufacturer's warranty against defects in materials, [fabrication and installation], excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of ten years, beginning at Date of Substantial Completion.
B. [For fabrications with installed warranty coverage, identify by affixing manufacturer's fabrication/installation source plate.]
C. Maintain surfaces in accordance with manufacturer's care and maintenance instructions.

D. Fabrications shall not have been moved from original place of installation.
E. Warranty shall be transferrable to subsequent owner.

PART 2 - PRODUCTS

2.1 SOLID POLYMER FABRICATIONS:

A. Acceptable Products: 1. E. I. du Pont de Nemours & Co., Inc., Corian® Surfaces.
B.
C.

2.2 MATERIAL:

A. Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124 1980, Type Six, and FS WW-P-541E/GEN dated August 1, 1980.
B. Material shall have minimum physical and performance properties specified.
C. Superficial damage to a depth of 1/32 inch shall be repairable by sanding or polishing.

D. Material Thicknesses: [1/4 inch][1/2 inch][3/4 inch].

1. Colors: As selected by Architect from manufacturer's standard [Genesis][Venaro][Sierra][Jewel][Summit]selection.

2. Edge Treatments: _____
3. _____

E. Sinks: Cast, solid polymer material, [undermount][seamed undermount] [seamed bevel mount], [single bowl] [double bowl][double bowl with molded drainboard] configuration, _____ color; Model #_____.
F. Lavatories: Cast, solid polymer material, [undermount][seamed undermount] [seamed bevel mount] configuration, _____ color; Model #_____.
G. Integral Vanities: Cast solid polymer material, lavatory cast integrally with counter; _____ color.
H. Performance Characteristics:

PROPERTY	REQUIREMENT	TEST PROCEDURE
Tensile Strength	5000 psi min	ASTM D638
Tensile Modulus	1.0 x 106 psi min	ASTM D638
Flexural Strength	7000 psi min	ASTM D790
Flexural Modulus	1.0 x 106	ASTM D790
Elongation	0.3% min.	ASTM D638
Strain at Break	0.8% min.	ASTM D638
Hardness	90-Rockwell "M" scale 52-Barcol Impressor min.	ASTM D758
Thermal Expansion	3.5 x 10-6 in/in/deg C max 1.95 x 10-6 in/in/deg F maxColor Stability	ASTM D696 No change, NEMA LD3-3.10 min. 100 hours
Wear and Cleanability	Passes	ANSI Z124.3
Abrasion Resistance	No loss of pattern Weight loss.	NEMA LD3-3.01 ANSI Z124.3
(1000 cycles)=0.9 g. maxBoiling water Surface Resistance		No Change NEMA LD3-3.05
High Temperature Resistance	No Change	NEMA LD3-3.06
Conductive Heat Resistance	No Change	NEMA LD3-3.08
Impact Resistance		
Notched Izodz	0.24 ft.-lbs./in. .	ASTM D256, Method A
Gardner	9.0 ft-lbs min.	ASTM D3029
Ball drop		NEMA LD3-303
1/4" sheet	36" min. with 1/2 lb ball, no failure	
1/2" sheet	140" min. with 1/2 lb ball, no failure	
3/4" sheet	200" min. with 1/2 lb ball, no failure	

Bowls (point impact)	No cracks or chips		ANSI Z124.3 and 124.6
Stain Resistance	Passes		ANSI Z124.3
Weatherability	No change, min. 1000 hours		ASTM D1499-84
Fungi and Bacteria	No Attack		ASTM G21, ASTM G22
Specific Gravity	1.6 min.		
Water Absorption	24 hrs.		Long Term ASTM D570
Weight	0.05 (1/4") max.	0.10 (3/4") max.	
(% max.)	0.50 (1/4") max.	0.90 (3/4") max.	

Flammability			ASTM E84
Solid Colors	1/4"	1/2"	3/4"
Flame spread	25 max	25 max	25 max
Smoke Developed	30 max	30 max	30 max
Class	1	1	1
Particulate Patterns	**1/4"**	**1/2"**	**3/4"**
Flame spread	25 max	25 max	25 max
Smoke Developed	30 max	30 max	30 max
Class	1	1	1

Pittsburgh Protocol Toxicity (as used by NY state)	solids-80 grams min. particulate patterns-65 grams min.	"LC50" Test

2.3 ACCESSORY PRODUCTS

A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints by chemical bond.

B. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive complying with ANSI A136.1-1967, UL listed.

C. Sealant: Manufacturer's standard mildew-resistant, FDA, UL listed silicone sealant in colors matching components.

D. Sink/Lavatory Mounting Hardware: Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.

E. Conductive Tape: 3M® aluminum foil tape, 4 mils thick, for use with cutouts near heat sources.

F. Insulating Felt Tape: Manufacturer's standard for use with conductive tape in insulating solid polymer from adjacent heat source.

2.4 FABRICATION:

A. Factory fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed Instructions and technical bulletins.

B. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints. Reinforce with strip of solid polymer material, 2" wide.

C. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the Drawings.

D. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

2.5 FINISH:

A. Provide surfaces with a uniform finish.

B. [Matte: Gloss range of 5-20.]

C. [Semi-gloss: Gloss range of 20-50.]

D. [Polished: Gloss range of 50-80.]

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine adjacent construction and supports.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Comply with the reference standard specified.
B. Install tops plumb and level, with tight, hairline, flush joints. Shim as required using concealed shims.
C. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
D. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
E. Scribe and fit accurately where they abut adjacent surfaces for a close fit.
    1. Fill space between countertops and walls with sealant; comply with the requirements of Section 07 92 00.
    2. Tool sealant uniformly to form a cove and shed water.
F. Install countertops with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.

3.3 CLEANING/PROTECTING

A. Clean and polish tops, and lavatories where applicable], in compliance with their manufacturer’s instructions.
B. Leave installations free of scratch, stains, and other damages.
C. Protect finished work until acceptance.

END OF SECTION

SECTION 12 48 16 - FLOOR GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes foot grilles, frames, pans, drains, strainers and accessories required for a complete installation.
B. Related requirements:
   1. Division 05 for trench drain gratings.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and sequencing:
B. Pre-installation meeting:

1.3 SUBMITTALS

A. Data:
   1. Manufacturer Product Data, specifications, roughing-in diagrams and installation instructions for the work of this Section.
   2. Supplement Product Data with Shop Drawings showing Project-specific conditions not illustrated on manufacturer’s Data. Identify the door opening, by number shown for adjacent doors on the Drawings.

B. Samples: 12 inches square Samples of extrusions with slip-resistant inserts.

PART 2 - PRODUCTS

2.1 FOOT GRILLES

A. C/S Pedigrid, DP Series by Construction Specialties Inc., or equal.
   1. Frame, grid and supports: Aluminum extrusions, mill finished, of the alloy selected by the fabricator. Supports and grid shall be designed by the manufacturer for a maximum deflection of L/240 with a live load of 100 psf.
   2. Grid inserts: Series 1500A aluminum oxide in an epoxy matrix of the color selected by the Architect from the manufacturer's palette.
   3. Drain pan: 16-gage, waterproof aluminum pan.
   4. Drainage fittings: Provide unit complete with 2-inch IPS drain and strainer.

PART 3 - EXECUTION

3.1 EXAMINATION/COORDINATION

A. Coordinate the installations with the work of related trades. Provide concrete trades with instructions and/or templates for installation of frames in formwork.
B. Examine adjacent construction.
C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Coat aluminum surfaces in contact with concrete with a heavy coating of bituminous paint.
B. Verify frame squareness and level, and set grilles securely in their frames, square and level with tight, hairline joints, and flush with adjacent floor.
C. Touchup minor damage or replace damaged parts as directed by the Architect at no additional cost to the Owner.

END OF SECTION

SECTION 12 52 19 – BANQUETTE SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wood-framed upholstered seating; banquette and bench.
B. Related requirements:

1. Section 05 50 00 concealed steel framing supporting banquette.
2. Section 06 10 53 for wood framing supporting banquettes.
3. Section 06 41 13 for finished wood veneer.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 SUBMITTALS

A. Data:

1. Manufacturer Product Data.
2. Include manufacturer's certification or other data substantiating that the materials comply with the specified requirements.

B. Shop Drawings: Show location of each item, including the following:

1. Dimensioned plans, elevations, and sections.
2. Attachment devices, and other components, including cushions.
3. Show large-scale details.
4. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples:

1. Full yard sample of each type of selected fabric.
2. Wood Trim: Twenty-four-inch by 4-inches wide for each specified wood specie.
    a. Finish, texture and pattern 18-inches of the 24-inch trim. Prepare Samples for final approval from the same material to be used for the Work.

D. Qualification Data: For banquette fabricator and Installer.

1. Furnish portfolio of completed work complete with photographs, project names, and list of client contacts.

E. Closeout: Fabric manufacturer’s recommendations for cleaning and maintenance.

1.4 QUALITY ASSURANCE

A. Fabricator qualifications: Firm with minimum 5 years documented experience in fabrication of upholstered furniture similar to that required for the Project.
B. Installer Qualifications: Install by fabricator.
C. Mockup: Before starting production work, assemble a 24-inch by full-size mockup of the banquette including cushion finished as intended for the finish work.
D. Fire performance requirements of upholstered seating:

1. Fabric and Padding:

a. Fabric: Class 1 according to DOC CS 191 or 16 CFR 1610, tested according to California Technical Bulletin 117-2000.
b. Padding: Comply with California Technical Bulletin 117-2000.

2. Upholstery Assembly: Assembly shall comply with component-testing requirements of California Technical Bulletin 117-2013.
3. State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, Technical Bulletins 116 and 117.
4. Ensure fabric and padding components comply with Class A requirements for flame spread and smoke developed indices in accordance with ASTM E84.

E. Banquette wood construction shall meet Woodwork Institute standards for custom grade.

1.5 HANDLING

A. Wrap assemblies after fabrication in breathable, waterproof packaging.
B. Store at the site in a protected, air- and humidity-controlled indoor location, similar to those in permanent use to avoid damage.

1.6 PROJECT CONDITIONS

A. Do not deliver and install the work of this Section until space is enclosed and weatherproof, wet-work in space is complete and nominally dry, installation of finishes including painting is complete, other work above ceiling are complete; and ambient temperature and humidity conditions will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fabric:: Refer to Finish Schedule on Drawings.
B. Or equal.
C. Filling-padding materials:

1. Provide high density, low Indentation Force Deflection (IFD) foam foundation.

a. 100% natural latex.
b. Thickness, density and Indentation Load Deflection (ILD) rating as indicated and required to yield the profiles shown after fabric is stretched and secured in place. Comply with ASTM D3574 - 08 Standard Test Methods for Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams.

2. Provide Dacron batting, no more than one-inch thick at seats, 1/2-inch thick at back, directly under the fabric. Bond foam layers, before shaping to required profile, to prevent movement.

D. Accessories, such as welt cording, when used and acceptable to the University's Representative, and trim: As selected by fabricator.

E. Plywood on banquettes:

1. Hardwood Veneer Plywood Paneling (exposed): Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.

a. Face Veneer Species and Cut: Plain-sliced white oak. Grade A.
b. Veneer Matching: Selected for similar color and grain.
c. Backing Veneer Species: Any hardwood compatible with face species.
d. Construction: Veneer core.
e. Thickness: As indicated on drawings.
f. Panel Size: 48 by 96 inches.
g. Glue Bond: Type II (interior).
h. Face Pattern: Smooth.
i. Finish: Match University's Representative's samples.

2. Concealed locations: Softwood plywood APA, Exterior Grade, C-C Plugged.

F. Hardwood Moldings for Transparent Finish (Stain or Clear Finish):

1. Species: White oak. Grade equal to Woodwork Institute premium grade.
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Matching: Selected for compatible grain and color.

G. Rough framing wood: As specified in Section 06 10 53.

2.2 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, Hanging Strips, and Nailers: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

1. Wood-Preservative Treatment: By pressure process, AWPA U1; Use Category UC3b.

a. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
b. Preservative Chemicals: Acceptable to California Green Code and containing no arsenic or chromium.
c. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.

2. Fire-Retardant Treatment: Complying with requirements; provide where indicated on Drawings.

B. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage and compliant with the California Green Code.

2.3 SHOP FABRICATION

A. Complete fabrication, including assembly and finishing, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
3. Notify University's Representative seven days in advance of the dates and times ornamental woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
    a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
    b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

B. Upholstery:

1. Welt cording shall be self-covered. Seams of welt covering shall only appear on the sides or rear of the seating units.
2. Tufting is not allowed on the seat cushions.
3. Installed fabric shall be taut, secure, smooth, and clean, without wrinkles, bubbles, gaps, overlaps, tears and other imperfections.
4. Fabricate seat cushion to fit tightly in their scheduled locations and provide concealed strips of Velcro and clips so that cushions will not slip or move when the seats are occupied as indicated.

2.4 SHOP FINISHING

A. Preparations for Finishing: Comply with the North American Architectural Woodwork Standards (NAAWS) for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing ornamental woodwork, as applicable to each unit of work.
B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of ornamental woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
C. Transparent Finish for Interior Items:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish: System - 12, Polyurethane, Water-Based.
3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
4. Staining: Match University's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions and approved shop drawings.
B. Install booths at locations indicated on the Drawings. Securely attach items to substrates either with expansion shields. Install in straight line, plumb, and level.
C. Scribe and cut booths to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
D. Anchor ornamental woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with ornamental woodwork.
3. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.
4. For shop-finished items, use filler matching finish of items being installed

E. Install cushions and backrest in compliance with the approved Shop Drawings, with tight joints and secure.

3.3 PROTECTING/ADJUSTING

A. Protect in-place cushions against damage and stains.
B. Replace damaged banquettes, and stains that cannot be cleaned to the University’s Representative’s satisfaction.

END OF SECTION

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DIVISION 31
EARTHWORK

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SECTION 31 10 00 - SITE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other materials.
2. Removal of concrete and bituminous surfaces.
3. Removal of existing fences and gates.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 2200 - Grading.
3. Section 31 2313 - Excavation and Fill.
4. Section 31 2316 - Excavation and Fill for Pavement.
5. Section 31 2319 - Excavation and Fill for Structures.
6. Section 31 2323 - Excavation and Fill for Utilities.
7. Section 31 2326 - Base Course.
8. ~~Section 32 3113 - Chain Link Fences and Gates~~.
9. ~~Section 32 9000 - Planting~~.

1.2 SUBMITTALS

A. Shop Drawings: Submit site plan indicating extent of site clearing.

1.3 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition, as a minimum requirement.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

1.4 TREE AND STUMP REMOVAL

A. Remove trees and stumps indicated or required to be removed. Remove trees, together with bulk of roots, to a minimum depth of 4 feet below required grade, and within a radius of approximately 7 feet beyond perimeter of trunk at grade.

B. Fill and compact excavation from tree and stump removal. Fill in 6 inch layers, each compacted to 90 percent of maximum density in accordance with ASTM D1557.

1. Back filling shall not commence until the excavation is inspected and tested.

1.5 ONCRETE AND BITUMINOUS SURFACING REMOVAL

A. Break up and completely remove existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to indicated limits. Cutting shall be performed to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1 1/2-inch, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

1.6 FENCING

A. Existing fences scheduled to remain may be removed to facilitate the Work, provided they are installed to their original condition in accordance with requirements of Section 32 3113 - Chain Link Fences and Gates.

B. Fencing indicated to be removed and not reinstalled shall be completely removed, including footings. Fill and compact excavations.

C. Install chain link fencing indicated to be relocated or reset in accordance with applicable requirements specified under Section 32 3113 - Chain Link Fences and Gates.

1.7 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 22 00 - GRADING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 1000 - Site Clearing.
3. Section 31 2313 - Excavation and Fill.
4. Section 31 2316 - Excavation and Fill for Pavement.
5. Section 31 2319 - Excavation and Fill for Structures.
6. Section 31 2323 - Excavation and Fill for Utilities.
7. Section 31 2326 - Base Course.
8. ~~Section 32 9000 - Planting~~.

1.2 PROJECT REQUIREMENTS

A. General:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.
4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on public buried utilities and pipelines. Retain the services of an underground utility locator for on-site utilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall conform to requirements specified in this and related sections.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain installed stakes until their removal is required for the Work. Provide replacement grade or location stakes lost or disturbed.
B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.2 ROUGH AND FINE GRADING

A. Rough grade area sufficiently high to require cutting by fine grading:

1. Grade area for bituminous surfacing and other paving to the indicated grades, equal to the section of the indicated base and pavement.
2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.
3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.
4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten and roll to obtain required density and indicated finish grades.
5. Tolerances: Finish grades shall be within a tolerance of 0.05 inch per foot above or below grades indicated. Provide an average grade as indicated.

B. Base or Subgrade:

1. After subgrade has been constructed to approximate required grades, scarify to a depth of at least 6 inches:

a. After scarifying, process loosened material to a finely divided condition and adjust moisture content to optimum condition by addition of water, addition and blending of dry suitable material, or by drying of existing material.

EDIT NOTE: EDIT THE FOLLOWING COMPACTION PERCENTAGE, TO REFLECT RECOMMENDATIONS CONTAINED IN THE SOILS REPORT.

b. Subgrade material shall be compacted by tamping, sheepsfoot rollers or pneumatic tire rollers. Required relative compaction shall be [90] percent minimum for the top 6 inches below subgrade.
c. Install base course in accordance with Section 31 2326 - Base Course.

2. Tolerance of completed grades of base or subgrade shall not vary more than 0.03 inch per foot from grades indicated. Provide an average grade as indicated.

3.3 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
B. Design and Calculations: Provide in accordance with requirement of CalOHSA.

C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.4 EXCESS MATERIAL DISPOSAL

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.5 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 31 23 13 - EXCAVATION AND FILL

~~**EDIT NOTE: THIS SECTION IS FOR USE ON IN-HOUSE LAUSD PROJECTS.**~~

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.
2. Trenches for utility lines such as water, gas, irrigation, storm drain and sewer lines, concrete-encased conduits, manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes, and other utility appurtenances.

B. Related Requirements:

1. Division 01 - General Requirements.
2. ~~Section 01 4524 - Environmental Import/Export Materials Testing.~~
3. Section 31 1000 - Site Clearing.
4. Section 31 2200 - Grading.
5. Section 31 2326 - Base Course.
6. Section 32 0117 - Pavement Repair.
7. Section 32 1313 - Site Concrete Work.
8. ~~Section 32 3113 - Chain Link Fences and Gates~~.
9. ~~Section 32 8413 - Potable Water Irrigation.~~
10. ~~Section 32 8426 - Reclaimed Water Irrigation.~~
11. ~~Section 32 9000 - Planting.~~
12. ~~Section 33 1100 - Site Water Distribution Utilities.~~
13. ~~Section 33 3000 - Site Sanitary Sewer Utilities~~.
14. Section 33 4000 - Storm Drainage Utilities.
15. ~~Division 22 - Plumbing~~.
16. ~~Division 26 - Electrical.~~

1.2 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

A. Shoring calculations as required in Article 3.03 of this Section.

1.4 QUALITY ASSURANCE

A. Comply with the Standard Specifications for Public Works Construction, current edition, except as modified herein.
B. Sampling, testing, and certification of imported and exported soils shall be performed in accordance with Section 01 4524, Environmental Import/Export Materials Testing.

1.5 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.
B. Imported Soils: The Geotechnical Engineer will obtain initial product Sample for testing in accordance Article 3.05 of this Section.

1.5 PROJECT CONDITIONS

A. Information on Drawings or in soil investigation report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

A. Fill and backfill material shall be a granular material previously removed from excavation or imported fill material, free of clods and stones larger than 3 inches, (2½ inches for utility trenches) foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
B. Fill material exhibiting a wide variation in consistency and moisture content shall be blended and aerated to stabilize and upgrade the material.
C. Bedding material from trench bottom to one foot above the pipe:

1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.
2. Sand complying with the Specifications for cement concrete aggregates.

D. Brick rubble and broken concrete originating from the Project site shall be legally disposed of off the Project site No such material shall be imported from outside the Project site.
E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80 to 100
No. 100	0 to 8
No. 200	0 to 3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.

3. Provided backing for weep-holes shall consist of two cubic feet of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system Miradrain by Mirafi, Inc., American Wick Drain, JDR Enterprises, or equal, may be provided if reviewed and approved by the ARCHITECT.

F. Cement-sand slurry shall be provided with one sack of cement per cubic yard of the mixture.

2.2 BASE MATERIALS

A. Concrete Slabs on Grade: Provide "Crushed Aggregate Base" as specified in Standard Specifications for Public Works Construction, Section 200 - Rock Materials, with 3/4 inch maximum size aggregates. Provide 3 inch thick base, unless noted otherwise.
B. Bituminous Surfacing: Provide as indicated on Drawings and specified in Section 31 2326 Base Course.

PART 3 - EXECUTION

3.1 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.
B. Where the Work includes a building extension or addition on an occupied Project site, perform Work in such a manner, and at such times, as not to disrupt performance of existing utility services to existing Project site facilities. Where an interruption is necessary, obtain review from the OAR before proceeding.
C. Remove concrete or bituminous pavement to straight lines by saw cutting.

3.2 PROTECTION

A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
B. Protect existing improvements including landscaping against damage. Repair or replace damaged items.
C. Protect existing utility services and distribution systems from damage or displacement.
D. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of two feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.
E. Shore, crib, or lag excavations and earthen banks as necessary to prevent cave in, erosion or gullying of sides.
F. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed earth and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

3.3 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
B. Design and Calculations: Provide in accordance with requirement of governing Cal-OSHA requirements.
C. Remove shoring upon completion of the Work of this Section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.4 EXCAVATION

A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork", except as modified herein.
B. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other required Work.
C. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.
D. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.
E. Barricade trenches, ditches, pits, sumps, and similar Work outside the barricaded working area with chain link fence as specified in Section 01 5000 - Construction Facilities and Temporary Controls, and in accord with Cal-OSHA standards and requirements.
F. Trenches over five feet in depth shall comply with the Construction Safety Orders of the California Division of Industrial Safety.
G. Where indicated or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.
H. For Structures:

    1. Calculate excavation quantities based on elevations or depths indicated on Drawings.
    2. Provide 2,000 psi concrete for backfill of over-excavated areas to indicated or required elevations.
    3. Special preparation of bottom of excavated planes areas: Excavate areas shown on Drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.

I. For Utilities:

    1. Excavate trenches to required depth for utility lines, such as pipes, conduits, and tanks, with minimum allowance of 6 inches at the bottom and 6 inches at the sides for bedding or concrete encasement as indicated on Drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before placing sand bedding or concrete encasement.
    2. Do not install piping lengthwise under concrete walks without review by the ARCHITECT.
    3. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9 inches above bottom of footings.

a. Unless otherwise indicated on Drawings, depth of excavations outside buildings shall provide for a minimum coverage above top of piping, tank or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finish grade
Copper Water Tube	18 inches below finish grade
Cast-Iron, Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structure	36 inches below finished grade
Soil, sewer and storm drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. Install polypropylene sewer pipe with at least 24 inches of coverage.
Irrigation Pipe:	Non-pressure pipe - 12 inches, pressure pipe - 24 inches.

b. Trench width shall provide space for fitting and joining. Excavate for piping bells and fittings, bell and spigot pipe and other fittings.

4. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements. Repair pavement as specified in Section 32 0117 - Pavement Repair.
5. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits placed in the same trench or outside surfaces of containers and tanks.

3.5 IMPORT/EXPORT OF MATERIALS

A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300 - Earthwork, except as modified herein. Install and compact fill in layers not to exceed 6 inches in thickness.
B. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
C In addition to the requirements of this Section, import and/or exported materials shall comply with the requirements of Section 01 4524, Environmental Import/Export Materials Testing.
D. Imported fill materials shall be sampled by the Geotechnical Engineer, for compliance with the requirements of Part 2 of this Section.
E. The Geotechnical Engineer, will submit the samples to an independent DSA approved testing laboratory for testing.
F. Initial sampling and testing shall be performed before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and entity responsible for the source site. The Geotechnical Engineer, will obtain both the initial and additional samples from the identified site and submit samples for required testing.
G. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
H. The independent approved testing laboratory will perform the required tests and report results of tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, California Building Code,

and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by the CBC.

I. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.

J. Upon completion of import operations, provide the OAR a certification statement attesting that imported material has been obtained from the identified source site.

3.6 INSTALLATION OF MATERIALS

A. Pavement: Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the Geotechnical Engineer, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but not more than 1 in 20. Provide adequate drainage at all times during installation of the Work of this Section.

B. Structures:

1. After concrete has been placed, forms removed, and concrete Work inspected, backfill excavations with earth to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris and other waste materials from excavations before placing backfill.
2. Before placing backfill, adequately cure concrete and provide bracing, if required to stabilize structure. Protect waterproofing or damp-proofing against damage during backfilling operations, with required protection board. Remove bracing as backfill operation progresses.
3. Do not furnish or install expansive soils for retaining wall backfill.
4. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.
5. Install wall backfill before installing railings and fences on walls.
6. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8-inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.
7. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

C. Utilities:

1. Do not install backfill until the Work of this Section has been inspected and tested. Do not furnish or install materials excavated from the Project site containing materials not permitted for backfill.
2. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the IOR.
3. Install backfill in layers not exceeding 4 inches in thickness, except cement-sand slurry.
4. If materials excavated from the Project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grades plus one inch.

3.7 COMPACTING

A. Each layer of fill material shall be compacted by tamping, sheepsfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.
B. Install and compact sand bedding to provide a uniform bearing under the full length of piping and conduits.

~~**EDIT NOTE: EDIT THE FOLLOWING COMPACTION PERCENTAGE, TO REFLECT RECOMMENDATIONS CONTAINED IN THE SOILS REPORT.**~~

C. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least ninety percent.
D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality for testing as set required in Part 2 and observe installation and compaction of fill materials.
B. The Geotechnical Engineer will sample imported fill materials from their designated source and submit samples to the independent approved testing laboratory before delivery to the Project site.
C. Installation of backfill shall be observed by the Geotechnical Engineer.
D. The Geotechnical Engineer will inspect and test excavation Work before the installation of fill and other materials.
E. Compaction: Test compaction in accordance with ASTM D1557, Method C.
F. The Project Inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.9 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

3.10 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 23 16 - EXCAVATION AND FILL FOR PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating, backfill, and compacting for paved areas.
2. Installation of fill materials.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 4524 - Environmental Import/Export Materials Testing.
3. Section 31 1000 - Site Clearing.
4. Section 31 2200 - Grading.
5. Section 31 2323 - Excavation and Fill for Utilities.
6. Section 32 2326 - Base Course.
7. Section 32 0117 - Pavement Repair.
8. Section 32 1216 - Asphalt Paving.
9. Section 32 1313 - Site Concrete Work.

1.2 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition, except as modified herein.

B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Materials Testing.

1.4 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.

B. Imported Soils: The Geotechnical Engineer will obtain initial product Sample for testing in accordance Article 3.05 of this Section.

1.5 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.1 BASE MATERIALS

A. Concrete Slabs On Grade: Provide “Crushed Aggregate Base “as specified in the Standard Specifications for Public Works Construction, Section 200: “Rock Materials,” with ¾ inch maximum size aggregates. Provide 3-inch thick base, unless noted otherwise.
B. Bituminous Surfacing: As indicated on Drawings and specified in Section 31 2326 - Base Course.

2.2 FILL AND BACKFILL MATERIALS

A. Fill and backfill materials shall be previously excavated materials or imported fill material, free of clods and stones larger than 3-inch, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
B. Fill material exhibiting a wide variation in consistency and moisture content shall be blended or aerated to stabilize and upgrade the material.
C. Imported Fill Material:

1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

D. Brick rubble and broken concrete originating from the Project site shall be legally disposed of off the Project site. No such materials shall be imported from outside the Project site.
E. Permeable Backfill:

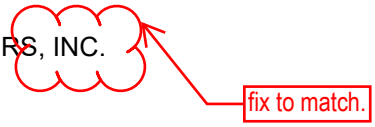
1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

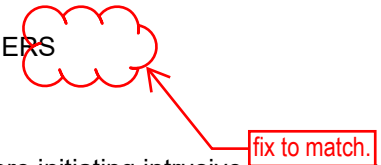
Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80 to 100
No. 100	0 to 8
No. 200	0 to 3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
3. Provided backing for weep holes shall consist of two cubic feet of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system, Miradrain by Mirafi, Inc., or equal, may be provided if reviewed and approved by the ARCHITECT.

PART 3 - EXECUTION

3.1 GENERAL





A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.
B. Clear the Project site as indicated in Section 31 1000 - Site Clearing.

3.2 PROTECTION

A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, Cal-OSHA regulations.
B. Protect adjacent existing improvements including landscaping against damage.

3.3 EXISTING UTILITY LINES

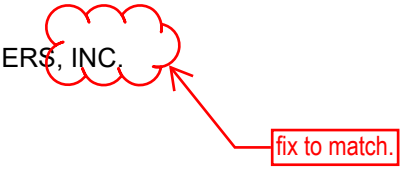
A. Protect existing utility lines from damage or displacement.
B. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of 2 feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.

3.4 EXCAVATION

A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.

3.5 FILL

A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.
B. Provide fill materials as specified in Part 2 - Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
C. In addition to the requirements of this Section, import and/or exported materials shall comply with the requirements of Section 01 4524 - Environmental Import/Export Materials Testing.
D. Imported fill materials will be sampled by the Geotechnical Engineer for compliance with the requirements of Part 2 of this Section.
E. The Geotechnical Engineer will submit samples to a DSA approved independent approved testing laboratory for testing.
F. Initial sampling will be performed by the Geotechnical Engineer before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The Geotechnical Engineer will obtain both the initial and additional samples from the identified site and will submit samples to the approved independent testing laboratory for testing.
G. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1,000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1,000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
H. The independent approved testing laboratory will perform the required tests and report results of tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, Owner's Authorized Representative, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, CBC, and the Owner's Authorized Representative. Upon completion of the Work of this Section, the independent testing laboratory



and Geotechnical Engineer shall submit a verified report to the Owner's Authorized Representative as required by CBC.

I. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.

J. Upon completion of import operations, provide the Owner's Authorized Representative a certification statement attesting that imported material has been obtained from the identified source site.

3.6 INSTALLATION OF MATERIALS

A. Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the Geotechnical Engineer, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but no more than 1 in 20. Provide adequate drainage at all times during construction of the Work of this Section.

3.7 COMPACTING

A. Each layer of fill material shall be compacted by tamping, sheepsfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.

B. Unless otherwise indicated, compact each layer of earth fill to a relative compaction of at least 90 percent.

C. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each compacted layer before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.

B. The Geotechnical Engineer will sample imported fill materials from their designated source before delivery to the Project site.

C. Installation of backfill will be observed by the Geotechnical Engineer.

D. The Geotechnical Engineer will inspect and test excavation Work before the installation of fill and/or other materials.

E. Compaction: Test compaction in accordance with ASTM D1557, Method C.

3.9 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

3.10 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 2319 - EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating, backfilling, and compacting for buildings and structures.
2. Fill materials.

B. Related Requirements:

1. Division 01 - General Requirements.
2. ~~Section 01 4524 - Environmental Import/Export Materials Testing~~.
3. Section 31 1000 - Site Clearing.
4. Section 31 2200 - Grading.
5. Section 31 2616 - Excavation and Fill for Paving.
6. Section 31 2323 - Excavation and Fill for Utilities.

1.2 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

A. Imported Soils: A Geotechnical Engineer, retained by the Owner as an Owner Consultant, will obtain initial product Sample for testing in accordance with the terms of Article 3.05 of this Section.
B. Shoring calculations as required in Article 3.03 of this Section.

1.4 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition, except as modified herein.
B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Materials Testing.

1.5 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.
B. Imported Soils: The Geotechnical Engineer will obtain initial product Sample for testing in accordance Article 3.05 of this Section.

1.6 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

A. Fill and backfill materials shall be a granular material previously removed from excavation, or imported fill material, free of large clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
B. Fill material exhibiting a wide variation in consistency and or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
C. Imported Fill Material:

1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than two percent from air dry to optimum moisture content and not more than six percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

D. Brick rubble and broken concrete originating from the Project site shall be legally disposed of off the Project site No such materials shall be imported from outside the Project site.
E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size	Percentage Passing
3/4 inch	100
3/8 inch	80 to 100
No. 100	0 to 8
No. 200	0 to 3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
3. Provided backing for weep-holes shall consist of two cubic feet of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system, Miradrain by Mirafi, Inc., or equal, may be provided if reviewed and approved by the ARCHITECT.

PART 3 – EXECUTION

3.1 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.
B. Clear the Project site as indicated in Section 31 1000 - Site Clearing.

3.2 PROTECTION

A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, Cal-OSHA regulations.
B. Protect adjacent existing improvements including landscaping against damage.
C. Shore, crib, or lag excavations and earthen banks as necessary to prevent caving-in, erosion or gullying of sides.
D. Divert or de-water excavations until concrete is placed, forms are removed, and backfilling is complete.

3.3 SHORING

A. Provide shoring as necessary to properly and safely support earth sides of excavations, curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
B. Design and Calculations: Provide in accordance with requirement of Cal-OHSA. Remove shoring upon completion of Work, or when no longer needed.

3.4 EXCAVATION

A. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other Work as required.
B. Machine-drill excavation for round footings to size and depth indicated. Provide a collar or casing, or other adequate protection, to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.
C. Provide excavation bottoms level and free from loose material. Excavate to indicated or required elevations of undisturbed earth.
D. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.
E. Calculate excavation quantities based on elevations or depths indicated on Drawings.
F. Provide 2,000 psi concrete for backfill of over-excavated areas to indicated or required elevations.
G. Special preparation of bottom of excavated planes areas: Excavate areas designated on Drawings as bottom of excavated planes (B.E.P.), by excavating and filling to indicated grades and elevations.

3.5 IMPORT/EXPORT OF MATERIALS

A. Provide fill materials as specified in Part 2- Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.

B. In addition to the requirements of this Section, import and/or exported materials shall comply with the requirements of Section 01 4524 - Environmental Import/Export Materials Testing.
C. Imported fill materials will be sampled by the Geotechnical Engineer for compliance with the requirements of Part 2 of this Section.
D. The geotechnical engineer will submit all samples to a DSA approved independent testing laboratory for testing.
E. Initial sampling will be performed by the Geotechnical Engineer before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The Geotechnical Engineer will obtain both the initial sample and additional samples from the identified site and will submit samples to the approved independent testing laboratory for testing.
F. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1,000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1,000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
G. The independent approved testing laboratory will perform the required tests and report results of tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, CBC and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by CBC.
H. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.
I. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.6 BACKFILLING

A. After concrete has been placed, forms removed and concrete Work inspected, backfill excavations to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish, debris, and other waste materials from excavations before placing backfill.
B. Before installing backfill, adequately cure concrete and provide bracing to stabilize structures. Protect waterproofing or dampproofing against damage during backfilling operations with required protection board. Remove bracing as backfill operation progresses.
C. Do not furnish or install expansive soils for below grade building walls.
D. Install each layer of material in a not to exceed thickness of 6 inches, unless otherwise required.
E. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished. Do not over-saturate or compact by flooding or jetting.
F. Install wall backfill before installing railings and fences on walls.
G. Impervious backfill materials shall be installed in layers along with and by the same methods specified for structure backfill. Impervious backfill materials shall be at the approximate grade and elevation and where exposed to erosion, shall be covered with at least a 12-inch layer of fill material as reviewed by the Geotechnical Engineer.
H. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep opening. Provide an 8-inch square section of 1/4 inch galvanized or aluminum screen, with a minimum wire diameter of 0.03 inch, and install at the backside of each weep hole before installing the backfill material.
I. Where a reviewed drainage matting system is provided instead of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

3.7 COMPACTING

A. Compact each layer of fill material by tamping, sheepsfoot rollers or pneumatic-tired rollers, to such extent as to provide specified relative compaction. At inaccessible locations, compact to specified requirements with hand-held, operated and directed compaction equipment.

EDIT NOTE: EDIT THE FOLLOWING COMPACTION PERCENTAGE, TO REFLECT WITH RECOMMENDATIONS CONTAINED IN THE SOILS REPORT.

B. Unless otherwise indicated, compact each layer of fill material to a relative compaction of at least 90 percent.
C. Do not compact by flooding or jetting.
D. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each layer of compacted fill before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.
B. The Geotechnical Engineer will sample imported fill materials from their designated source before delivery to the Project site.
C. Installation of backfill shall be observed by the Geotechnical Engineer.
D. The Geotechnical Engineer will inspect and test excavation Work before the installation of fill and/or other materials.
E. Compaction: Test compaction in accordance with ASTM D1557, Method C.
F. The Project Inspector will inspect foundation excavations when completed and ready for forms, after forms are in place and before first placement of concrete.

3.9 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

3.10 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 23 23 - EXCAVATION AND FILL FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating, backfilling, and compacting utility trenches such as water, gas, irrigation, storm drain, sewer lines, concrete-encased conduits, and manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes and other utility appurtenances.

B. Related Requirements:

1. Division 01 - General Requirements.
2. ~~Section 01 4524 - Environmental Import/Export Materials Testing.~~
3. Section 31 1000 - Site Clearing.
4. Section 31 2200 - Grading.
5. Section 31 2316 - Excavation and Fill for Paving.
6. Section 31 2319 - Excavation and Fill for Structures.
7. Section 32 0117 - Pavement Repair.
8. Section 32 1313 - Site Concrete Work.
9. ~~Section 32 8413 - Potable Water Irrigation.~~
10. ~~Section 32 8426 - Reclaimed Water Irrigation.~~
11. ~~Section 33 1100 - Site Water Distribution Utilities.~~
12. ~~Section 33 3000 - Site Sanitary Sewer Utilities~~.
13. Section 33 4000 - Storm Drainage Utilities.
14. ~~Division 22 - Plumbing.~~
15. ~~Division 26 - Electrical.~~

1.2 PROJECT REQUIREMENTS

A. Import and Export of Earth Materials:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works construction, current edition except as modified herein.

B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Materials Testing.

1.4 TESTING

A. OWNER will retain a Geotechnical Engineer as an OWNER Consultant who will provide observations, tests, inspections and approvals identified in the Contract Documents as being responsibility of OWNER.
B. Imported Soils: The Geotechnical Engineer will obtain initial product Sample for testing in accordance Article 3.02 of this Section.

1.5 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bedding material from trench bottom to one foot above the pipe:

1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.
2. Sand complying with the Specifications for cement concrete aggregates.

B. Backfill Materials:

1. Excavated trench material to be installed for backfilling shall be clean, free of large clods, and stones larger than 2 ½-inch in any dimension.

   Cement-sand slurry shall be provided with one sack of cement per cubic yard of the mixture.

   Imported Fill Material: Imported fill material shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing a 200 mesh sieve. Material shall provide a coefficient of expansion of not more than two percent from air dry to optimum moisture content and not more than six percent from air dry to saturation. Imported materials shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

PART 3 - EXECUTION

3.1 GENERAL

A. Before initiating intrusive activities, contact Underground Service Alert of Southern California (USA or Dig Alert) to obtain a Dig Alert ticket for location information on buried public and USA member utilities and pipelines at least 48-hours prior to beginning work. A copy of the Dig Alert ticket shall be forwarded to the OWNER. For on-site utilities, retain a state-licensed third party underground utility locating service.
B. Barricade trenches, ditches, pits, sumps, and similar Work outside the barricaded working area with chain link fence as specified in Section 01 5000, Construction Facilities and Temporary Controls, and in accordance with Cal-OSHA standards and requirements.
C. Saw-cut concrete or bituminous paving for trench installation.
D. Trenches over 5 feet in depth shall conform to the Cal-OSHA.
E. Where indicated and required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level

with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.

F. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.

G. Do not install piping lengthwise under concrete walks without review by the ARCHITECT.

H. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9 inches above bottom of footings.

1. Unless otherwise indicated on Drawings, depth of excavations outside the buildings shall allow for a minimum coverage above top of pipe, tank, or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finished grade
Copper Water Tube	18 inches below finished grade
Cast-Iron Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structures	36 inches below finished grade
Soil, Sewer & Storm Drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. (Install polypropylene sewer pipe with at least 24 inches coverage)
Irrigation Pipe:	nonpressure pipe 12 inches, pressure pipe 24 inches

2. Trench width shall provide ample space for fitting and joining. Excavate for piping bells and fittings, bell and spigot pipe and other fittings.

I. Unless indicated otherwise, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.

J. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.

K. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and tanks.

L. Do not install backfill until required inspections and testing is completed.

M. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the Project Inspector.

~~EDIT NOTE: EDIT THE FOLLOWING COMPACTION PERCENTAGE, TO REFLECT RECOMMENDATIONS CONTAINED IN THE SOILS REPORT.~~

N. Install backfill materials in layers not exceeding 4 inches in thickness and compact to 90 percent of the maximum density.

O. If materials excavated from the Project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grade plus one inch.

P. Install and compact sand bedding to provide a uniform full length bearing under piping and conduits.

Q. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match

adjoining existing improvements. Repair pavement as specified in Section 32 0117, Pavement Repair.

3.2 IMPORT/EXPORT OF MATERIALS

A. Provide fill materials as specified in Part 2, Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
B. In addition to the requirements of this Section, import and exported materials shall comply with the requirements of Section 01 4524, Environmental Import/Export Material Testing.
C. Imported fill materials will be sampled by the Geotechnical Engineer for compliance with the requirements of Part 2 of this Section.
D. The Geotechnical Engineer will perform the tests by utilizing an independent approved testing laboratory.
E. Initial sampling will be performed by the Geotechnical Engineer before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The Geotechnical Engineer will obtain both the initial sample and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory.
F. The Geotechnical Engineer will perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1,000 cubic yards of material, one sample shall be obtained and submitted for testing for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1,000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
G. The independent approved testing laboratory will perform the required tests and report results of all tests noting if the tested material passed or failed such tests and will furnish copies to the Project Inspector, ARCHITECT, OAR, DSA, CONTRACTOR, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, CBC and the DSA. Upon completion of the Work of this Section, the independent testing laboratory and Geotechnical Engineer will submit a verified report to the DSA as required by CBC.
H. Bills of lading or equivalent documentation will be submitted to the Project Inspector on a daily basis.
I. Upon completion of import operations, provide the OAR a certification statement attesting that imported material has been obtained from the identified source site.

3.3 INSPECTION AND TESTING

A. The Geotechnical Engineer will inspect and test excavations, sample material quality as required in Part 2, observe installation and compaction of fill materials.
B. Compaction test shall be performed in accordance with ASTM D1557, method "C."

3.4 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

3.5 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 31 23 26 - BASE COURSE

EDIT NOTE: THE USE OF CRUSHED MISCELLANEOUS BASE (CMB) IS NOT ALLLOWED ON DISTRICT'S PROJECTS.

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of base material.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 4524 – Environmental Import / Export Material Testing.
2. Section 31 1000 - Site Clearing.
3. Section 31 2200 - Grading.
4. Section 31 2313 - Excavation and Fill.
5. Section 31 2316 - Excavation and Fill for Paving.
6. Section 32 0117 - Pavement Repair.
7. Section 32 1216 - Asphalt Paving.
8. Section 32 1313 - Site Concrete Work.

1.2 SUBMITTALS

A. Crushed aggregate base (CAB) shall consist of native rock without naturally occurring asbestos or recycled materials. The CONTRACTOR shall submit written documentation, which identifies the source, volume, and proposed transport date of the material for review and approval by OWNER'S Office of Environmental Health and Safety (OEHS) prior to importing the material. A statement on company letterhead from the CAB source, stamped by either a California Professional Geologist or Engineer, which states that the subject materials are native rock, do not contain any recycled materials and that the source quarry does not mine ultramafic materials, a source of natural occurring asbestos shall be included in the submittal to OEHS. The CONTRACTOR may request variance from analytical testing required by Section 01 4524 for CAB. To be considered for a variance, the CONTRACTOR shall submit a documentation package for OEHS approval, which includes all of the aforementioned information at least 48 hours in advance of planned import.

1. Frequently used suppliers for LAUSD projects include:

   a. Hansen Aggregates.
   b. Vulcan Materials, Reliance Company.
   c. Vulcan Materials Durbin.

C. Product Data: Submit material source, technical information and test data for base materials. Gradation and quality certifications shall be dated within 30 days of the submittal.

D. Sample: Submit sample of proposed base course material.

1.3 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Crushed Aggregate Base (CAB) materials shall conform to the requirements of the Standard Specifications for Public Works Construction: Section 200 - Rock Materials.
B. Crushed Miscellaneous Base (CMB) or materials generated on site shall not be used as a base course material.

2.2 MATERIAL APPROVAL

A. Base material shall be inspected by the Project Inspector for gradation and material content prior to installation. The OWNER may choose to have additional tests performed by a geotechnical engineer, retained by the OWNER, before installation.

PART 3 - EXECUTION

3.1 INSTALLATION

EDIT NOTE: REVISE BASE COURSE COMPACTION PERCENTAGE IF OTHER THAN 95%.

A. Install base course material in layers not exceeding 4 inches in thickness, unless required otherwise. Grade and compact to indicated levels or grades, cut and fill, water and roll until the surface is hard and true to line, grade and required section. Provide a relative compaction of at least 95 percent, unless otherwise required.
B. Grade base course to elevations indicated on Drawings, ready to receive surfacing, in accordance with Section 31 2200 - Grading.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 01 17 - ASPHALT PAVEMENT REPAIR

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Bituminous Surfacing Repair: Areas removed for utility trenches, heaved by tree roots, cracked areas, protruding areas where pavement meets hard surfaces, depressed areas, holes and areas around new structures, and raveled bituminous pavement.
2. Areas heaved by tree roots, cracked areas, holes and trenches, and areas around new structures.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 31 2200 - Grading.
3. Section 31 2313 - Excavation and Fill.
4. Section 31 2316 - Excavation and Fill for Paving.
5. Section 31 2323 - Excavation and Fill for Utilities.
6. Section 31 2326 - Base Course.
7. Section 32 1216 - Asphalt Paving.
8. Section 32 1313 - Site Concrete Work.
9. Section 32 1236 - Seal for Bituminous Surfacing.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating areas to be repaired.
B. Product Data: Submit manufacturer’s technical data for materials and products.

1.03 QUALITY ASSURANCE

A. Comply with Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Base course materials: Section 31 2326 - Base Course.
B. Asphalt paving materials: Section 32 1216 - Asphalt Paving.
C. Seal materials: Section 32 1236 - Seal for Bituminous Surfacing.
D. Headers: Section 32 1216 - Asphalt Paving.

2.02 BITUMINOUS MATERIALS

A. Provide materials and products of the class, grade or type indicated, conforming to relevant provisions of Section 203 - Bituminous Materials of the latest Standard Specifications for Public Works Construction.

PART 3 - EXECUTION

3.01 PAVEMENT REMOVAL

A. Remove bituminous and concrete pavement in accordance with applicable provisions of Section 300 - Earthwork of the Standard Specifications for Public Works Construction.
B. Pavement Heaved By Roots: Remove pavement to limits of distortion and expose roots. Trim roots to provide at least 12-inch clearance to pavement. Coordinate with OWNER's Tree Trimming Department for recommendations and approval prior to trimming roots.
C. Remove protruding bituminous surfaces flush with the surrounding grade using a suitable tool or equipment so that adjacent finishes are not blackened.
D. Remove raveled and depressed bituminous pavement to limits indicated or required.
E. Saw cut existing improvements, trim holes and trenches in bituminous and concrete pavement to permit mechanical hand tampers to compact the fill.
F. Remove broken concrete by saw cutting. If the required cut line is within 30 inches of a score or joint line or edge, cut and remove to the score, joint line, or edge.

3.02 EXCAVATING, BACKFILLING AND COMPACTING

A. Conform to requirements in Section 31 2313 - Excavation and Fill; Section 31 2316 - Excavation and Fill for Paving; Section 31 2319 - Excavation and Fill for Structures; or Section 31 2323 - Excavation and Fill for Utilities, as required.
B. Where subgrade or base is deemed to be unstable or otherwise unsuitable, excavate such materials to firm earth, and replace with a required material. Install and compact fill materials in accordance with the requirements of Section 31 2316 Excavation and Fill for Paving.

3.03 HEADERS

A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of the adjacent undisturbed grade.
C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of two 12d galvanized common nails through each stake.
D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
F. Provide additional stakes and devices as required to fasten headers.

3.04 BASE COURSE

A. Unless otherwise indicated, base course shall be crushed aggregate base, fine grade, 3 inches thick or equal to thickness of the existing base, whichever is greater.
B. Fill grade and compact as specified in Section 31 2200 - Grading.

3.05 RESURFACING

A. Utility Trenches: Remove loose dirt and backfill with cement-sand slurry allowing for surfacing one inch thicker than existing. Resurface flush with existing adjoining pavement installing the same type of materials and section provided in existing improvements.

B. Other Areas: Other surface improvements damaged or removed shall be cut to a neat even line and excavated one inch below the bottom of the existing pavement. Resurface by following the original grades and installing the same type of materials provided in existing improvements.
C. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth materials before asphalt cools.

3.06 REPAIRING AND RESEALING EXISTING SURFACES

A. Preparation of Surfaces: Prior to filling cracks, clean existing bituminous surfacing of loose and foreign materials and coat with a film of asphalt emulsion.
B. Repair of Existing Surfacing:

1. Fill cracks 1/2 inch wide and less with RS-1 emulsion and washed plaster sand or other OEHS approved crack filler material. Cracks larger than ½ inch wide shall be filled with Type F/Sheet Mix Asphalt Concrete as specified. Cracks shall be filled to the level of adjacent surfacing.
2. Where low areas, holes, or depressions occur in existing surfacing, refer to Section 32 1216; Asphalt Paving, Article 3.02. Use Type E/School Mix and feather edge joint flush to the level of adjacent surfacing.

C. Testing: Flood test entire area in presence of the Project Inspector. Inspect area after waiting one hour. Entire area tested shall be free of standing water or puddles in excess of 0.01 foot. Practical field measurement: 0.01 foot = two quarters stacked.
D. Surface Seal: After surface has been repaired and tested, install seal coat over entire area indicated. Surface seal shall be as specified in Section 32 1236 - Seal for Bituminous Surfacing.

3.07 CLEANING

A. Remove all stains on the Project site and adjacent properties caused by or attributed to the Work of this section.
B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

DIVISION 32
EXTERIOR IMPROVEMENTS

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SECTION 32 12 16 ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Paving for playground, parking areas, areas between buildings surfacing adjacent to planting and turf areas as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 2200 - Grading.
3. Section 32 0117 - Pavement Repair.
4. Section 31 2326 - Base Course.
5. Section 32 1219 – Asphalt Paving for Running Track Surfacing.
6. Section 32 1236 - Seal for Bituminous Surfacing.
7. Section 32 1313 - Site Concrete Work.

EDIT NOTE: DELETE REFERENCE TO SECTION 32 18 19 IF NOT USED ON PROJECT.

8. Section 32 1819 – Solar Reflective Pavement Coatings.

1.2 SUBMITTALS

A. Shop Drawings: Submit site plan indicating extent of paving and accessories.
B. Product Data: Manufacturer’s technical data for materials and products.

1.3 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction.
B. ADA related slopes shall be measured with a twenty-four-inch digital level.

1.4 PROJECT CONDITIONS

A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
B. A copy of the soils report is available for examination in the office of the ARCHITECT during regular office hours of the ARCHITECT.

PART 2 - PRODUCTS

2.1 BITUMINOUS MATERIALS

A. Provide materials of the class, grade, or type indicated on the Drawings, conforming to relevant provisions of Section 203 - Bituminous Materials of the Standard Specifications for Public Works Construction.

NOTES:
1. INCORPORATE DISTRICT STANDARD TECHNICAL DRAWING C-203 IN THE CONSTRUCTION DOCUMENTS.
2. CONCRETE HEADERS ARE TO BE USED TO REDUCE LONG TERM MAINTENANCE. USE REDWOOD HEADERS ONLY AT EXISTING SCHOOLS FOR REPLACEMENT. REDWOOD HEADERS MAY NOT BE USED WITHIN 10 FEET FROM A BUILDING. HEADERS ARE TO BE INDICATED AND DETAILED ON DRAWINGS.

B. Asphalt Concrete Mix:

1. Paved slopes: Type III, D, PG-64-10.
2. Between buildings, playgrounds, parking and fire lanes: Type III, C3, PG-64-10.
3. Driveways for trash and delivery trucks: Type III, C3, PG-64-10 and Type III, B3, PG-64-10

2.2 HEADERS

A. Concrete: Per specification Section 32 1313 - Site Concrete Work.

EDIT NOTE: USE OF WOOD HEADERS IS FOR LAUSD MAINTENANCE & OPERATIONS IN-HOUSE PROJECTS ONLY. DELETE PARAGRAPH B ENTIRELY.

B. Wood:

1. Redwood, Construction Heart Grade, size 2 by 6, unless otherwise indicated.
2. Stakes: 2 by 4 redwood or 2 by 3 Douglas fir, Construction Grade.
3. Nails: Common, galvanized, 12d minimum.

PART 3 - EXECUTION

3.1 HEADERS

A. Concrete Headers:

1. Install headers along edge of bituminous surfacing as indicated on the Drawings.
2. Verify that gradients and elevations of base are correct. Maintain subgrade clean and in a smooth, compacted condition until the concrete is placed.
3. Construct forms, install steel reinforcement and place concrete as indicated on Section 32 1313 Site Concrete.

EDIT NOTE: USE OF WOOD HEADERS IS FOR LAUSD MAINTENANCE & OPERATIONS IN-HOUSE PROJECTS ONLY; DELETE PARAGRAPH B ENTIRELY.

B. Wood Headers:

1. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
2. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of adjacent undisturbed earth.
3. Fasten wood headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on center with top of stakes set one inch below top of header. Provide a minimum of two 12d galvanized common nails through each stake.
4. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
5. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
6. Provide additional stakes and anchorage as required to fasten headers in place.

3.2 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

A. Pavement Thickness: Unless otherwise indicated on Drawings or specified, install bituminous surfacing to a compacted thickness of 2 inches.
B. Base course shall be as specified in Section 31 2326, Base Course.
C. Surfaces of walls, concrete, masonry, or existing bituminous surfacing indicated to be in direct contact with installed bituminous surfacing shall be cleaned, dried and uniformly coated with an asphaltic emulsion film.
D. Thicken edges of bituminous surfacing that do not abut walls, concrete, or masonry, and at edges joining existing bituminous surfaces. Remove headers at existing bituminous surfacing where new bituminous surfacing is to be installed. Thicken edges an additional 2 inches and taper to the indicated or specified thickness 6 inches back from such edges.
E. At stairways, adjust thickness of paving such that the first tread is equal in height to all other treads.
F. Provide adequate protection for concrete, planting areas, and other finish Work adjacent to areas indicated to receive bituminous surfacing.
G. Placing:

1. Do not install bituminous surfacing when atmospheric temperature is below 40 degrees F; or when fog or other unsuitable weather conditions are present. Temperature of mixture at time of installation shall not be lower than 260 degrees F in warm weather or higher than 320 degrees F in cold weather.

2. Where 2-inch or 3-inch thick surfacing is indicated or specified, install surfacing in one course.

3. Where surfacing is indicated or specified 4 inches or more in thickness, except for thickened edges, install bituminous surfacing in courses of approximately equal thickness, each course not exceeding 2 ½ inches in thickness.

H. Stakes or Screeds: Provide grade or screed stakes spaced not more than 15 feet apart in flow lines with grades of less than one percent. Continuous screeds may be provided instead of stakes.
I. Spreading: Install bituminous surfacing in a manner to cause least possible handling of mixture. In open areas and wherever practicable, install by mechanical means with a self-propelled mechanical spreader. In confined or restricted areas, install mixture with hot shovels and rakes, and smooth with lutes.

J. Joints: Provide vertical joints between successive runs. Install joints true to line, grade, and cross section. Lapped joints are not permitted.

K. Rolling:

1. Finish roll with a self-propelled tandem roller weighing at least 8 tons. Break down roll with a self-propelled roller weighing between 1 ½ tons and 8 tons.
2. Roll in a manner that preserves flow lines and the established finished grades. Break down roll in areas adjacent to flow lines parallel to flow lines. Break down roll after bituminous surfacing is installed without shoving or cracking of mixture under roller. Continue finish rolling until surfacing is unyielding, true to grade, and meets requirements for specified smoothness. Areas inaccessible to finish roller may be finish rolled with breakdown roller or tamped with hot tamping irons and smoothed with hot smoothing irons, hand roller or asphalt plate compactor.
3. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth to properly compact.
4. Compacted bituminous surfacing shall be provided with a bulk specific gravity of at least 2.31 when tested in accordance with ASTM D1188.

L. Allow bituminous surfacing a thirty day curing time before applying surface seal.

3.3 TOLERANCE

A. Smoothness: Surface of bituminous surfacing after rolling, shall be even, smooth and uniform in texture with no voids or rock pockets, free of roller marks or other irregularities, and not varying by more than 0.03 foot, except at local depressions or raised areas as indicated, when a 10-foot straightedge is placed on surface.

B. Grade: Finished grade shall not vary more than 0.02 foot above or below required grade. Variations within prescribed tolerance shall be compensating so that average grade and cross-section are provided.

3.4 TESTING

A. Asphalt Pavement to Receive Solar Reflective Coating:

1. After asphalt paving has been installed and after a 24 hour period, flood test entire area in presence of the Project Inspector. Inspect area after waiting one hour. Entire area tested shall be free of standing water or puddles in excess of 0.01 foot. Practical field measurement 0.01 foot = two quarters stacked. Repair areas of standing water or puddles and flood test locally; install surface seal and retest as necessary.
2. No seals are to be applied to areas of asphalt paving that are to receive solar reflective coatings.

B. Asphalt Pavement to Receive Bituminous Seal: refer to Section 32 1236 Seal for Bituminous Surfacing.

EDIT NOTE: DELETE ARTICLE 3.05 BELOW IF SOLAR REFLECTIVE PAVEMENT COATING, SECTION 32 1819, WILL BE USED ON PROJECT.

3.5 SURFACE SEALING

A. Refer to Section 32 1236 - Seal for Bituminous Surfacing.
B. Where indicated, provide multiple coats of surface seal to existing bituminous surfacing.
C. Where new bituminous surfacing joins existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.

3.6 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.7 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 12 36 - SEAL FOR BITUMINOUS SURFACING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Surface sealer over bituminous surfacing.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 32 0117 - Pavement Repair.
3. Section 32 1216 - Asphalt Paving.
4. Section 32 1723 - Pavement Marking.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product information and application procedures for bituminous surfacing.

1.3 QUALITY ASSURANCE

A. Comply with the Standard Specifications for Public Works Construction, current edition.
B. Agitate bulk materials during transport.

1.4 MAINTENANCE

A. Extra Materials: Provide 10 gallons in unopened containers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide one of the following surface seals:

	Product Name	Manufacturer
1.	Guard-Top	CALMAT / Industrial Asphalt
2.	Over Kote	Diversified Asphalt Product
3.	Park Top	Western Colloid Products
4.	Sure Seal	Asphalt Coating Engineering
5.	Super Drive Top.	SAF– T Seal. Inc.
6.	Equal.	

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Thoroughly wash surfaces with water to remove dirt, debris, excessive oil and grease, or other foreign matter.

3.2 APPLICATION

A. Install seal coat in strict accordance with manufacturer's written directions and recommendations.
B. Install two coats of surface seal to new bituminous surfacing. First coat shall be installed before flood testing. Clean surface and allow to dry before installing second coat. Second coat shall be installed after bituminous surfacing has passed flood test.
C. Where new bituminous surfacing is installed adjacent to existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.
D. Where existing bituminous surfacing is indicated to be patched and sealed, install two coats of surface seal after patching. Refer to Section 32 1216 - Asphalt Paving.

3.3 PROTECTION OF SURFACES

A. Protect sealed and unsealed surfaces from damage and traffic during performance of the Work of this section and until surface seal has thoroughly set and cured. Do not permit traffic of any kind for at least 24 hours after completion of installation.
B. Protect the Work of this section until Substantial Completion.

3.4 TESTING

A. OWNER reserves the right to obtain samples, perform tests to ensure compliance with the Specifications, and to review weight slips and invoices of materials delivered to the Project site.
B. After first coat of surface seal has been installed and after a 24-hour period, flood test entire area in presence of the Project Inspector. Inspect area after waiting one hour. Entire area tested shall be free of standing water or puddles in excess of 0.01 foot. Practical field measurement: 0.01 foot = two quarters stacked. Repair areas of standing water or puddles and flood test locally; install surface seal and retest as necessary.

3.5 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 32 13 13 - SITE CONCRETE WORK

EDIT NOTES:
1. THIS GUIDE SPECIFICATION SECTION IS FOR ON-SITE WORK ONLY. FOR OFFSITE WORK REFER TO SECTIONS 01_3593 OFFSITE IMPROVEMENT PROCEDURES OR 01_3596 OFFSITE IMPROVEMENT PROCEDURES B-PERMIT, AS APPLICABLE.
2. INCLUDE SECTIONS 03 1000, 03 2000 AND 03 3000 IN SPEC BOOK IF PROJECT INCLUDES STRUCTURAL WORK SUCH AS RETAINING WALLS, FOOTINGS OR EQUIPMENT PADS.
3. INCLUDE SECTION 01 4524 ENVIRONMENTAL IMPORT / EXPORT MATERIALS TESTING IN THE SPEC BOOK.
4. CONCRETE SLABS FOR OPEN STRUCTURES SUCH AS COVERED WALKWAYS, ARCADES AND LUNCH SHELTERS SHALL BE 5 INCHES THICK WITH # 4 REBARS AT 24 INCHES ON CENTER EACH WAY.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: On-site concrete work:

1. Portland cement concrete pavement, driveways, curbs, gutters and mowing strips.
2. Ramps and stairs on grade.
3. Footings for fence posts, bollards, flagpoles, shade structures, light standards and athletic and playground equipment.
4. Pipe encasements, thrust blocks, and equipment pads.
5. Retaining walls, planter walls and concrete benches.
6. Skateboard deterrents.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 1000 – Concrete Forming and Accessories.
3. Section 03 2000 - Concrete Reinforcement.
4. Section 03 3000 – Cast-in-Place Concrete.
5. Section 03 3800 – Post Tensioned Concrete Slab - Tennis Courts.
6. Section - 05 5100 Metal Stairs.
7. Section 07 9200 – Joint Sealants.
8. Section 10 7516 – Flagpoles.
9. Section 11 6813 – Playfield Equipment and Structures – Primary Centers and Elementary Schools.
10. Section 11 6816 – Playfield Equipment and Structures – Middle and High Schools.
11. Division 23 - HVAC.
12. Division 26 - Electrical.
13. Section 31 2200 – Grading.
14. Section 31 2316 - Excavation and Fill for Pavement.
15. Section 31 2319 – Excavation and Fill for Structures.
16. Section 31 2326 - Base Course.
17. Section 32 1216 - Asphalt Paving.

18. Section 32 1219 – Asphalt Paving for Synthetic Running Track Surfacing.
19. Section 32 1723 – Pavement Markings.
20. Section 32 1816 – Playground Protective Surfacing.
21. Section 32 3113 - Chain Link Fences and Gates.
22. Section 33 1100 - Site Water Distribution Utilities.
23. Section 33 3000 - Site Sanitary Sewer Utilities.
24. Section 33 4000 - Storm Drainage Utilities.

1.2 REFERENCES

A. Structural work, such as retaining walls, planter walls, cast-in-place benches, equipment pads, and footings for playground equipment, fences, walls, shade structures and flagpoles shall conform to the following Sections:

1. Section 03 1000 Concrete Forming.
2. Section 03 2000 Concrete Reinforcing.
3. Section 03 3000 Cast-in-Place Concrete.

B. Flatwork, such as walkways, driveways, ramps and steps on grade, swales, curbs, mow strips and utility related concrete, conform to:

1. Standard Specifications for Public Works Construction, The “Greenbook”, except reclaimed aggregates and processed miscellaneous base are not allowed.

C. Imported or exported earthwork shall conform to Section 01 4524 Environmental Import / Export Materials Testing.

D. National Ready Mixed Concrete Association (NRMCA):

1. Checklist for the Concrete Pre-Construction Conference.

1.3 QUALITY ASSURANCE

A. Source Limitations for Exposed Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties. Secure material required for the duration of the project as needed to ensure consistent quality in appearance.

B. Pre-Installation Conference:

1. CONTRACTOR shall coordinate and conduct pre-installation conference in conformance to Section 01 3119 Project Meetings.
2. CONTRACTOR shall use the NRMCA “Checklist for the Concrete Pre-Construction Conference” as the meeting agenda.

C. Mockup:

1. Build 8 feet by 8 feet mockups of full-thickness sections of concrete paving using processes and techniques intended for use on permanent work, including curing procedures.
2. Build mockups to demonstrate typical joints; surface finishes and standard of workmanship.
3. Obtain ARCHITECT’s approval of mockup before proceeding with work of this Section.
4. Mockup shall remain through completion of the work for use as a quality standard for finished work.

5. Remove mockup when directed by the OAR.

D. Field applied primers, paintings, sealers, sealants, caulking, leveling and patching compounds, crack/joint repair compounds adhesives and similar products shall be approved by the OWNER's Office of Environmental Health and Safety (OEHS).
E. ADA related slopes shall be measured with a twenty-four-inch digital level.

1.4 SUBMITTALS

A. Structural Work: Conform to the applicable requirements of Sections 03 1000 Concrete Forming, 03 2000 Concrete Reinforcing and 03 3000 Cast-in-Place Concrete.
B. Flatwork: Submit mix design in conformance to the Greenbook.
C. Shop Drawings: Submit drawings indicating the locations of concrete joints, including construction joints, expansion joints, isolation joints, and contraction joints.

EDIT NOTE: SELECT ONE OF THE PARAGRAPHS BELOW IF COLORED CONCRETE IS USED. DELETE IF NOT APPLICABLE TO THE PROJECT.

D. Submit concrete Sample of each specified color.
E. Submit full range of manufacturer's standard and custom range colors and products for ARCHITECT's review and selection.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store cement and aggregate materials so to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.
B. Packaged materials shall bear the manufacturers and brand name label and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.
C. Avoid exposure of reinforcing steel bars, wire, and wire fabric to dirt, moisture or conditions harmful to reinforcing.
D. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated by size and shape.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Work: Conform to the applicable requirements of the following Sections, except as otherwise specified:

1. Section 03 1000 Concrete Forming.
2. Section 03 2000 Concrete Reinforcing.
3. Section 03 3000 Cast-in-Place Concrete.
4. Section 07 9200 Joint Sealants.

B. Flatwork: Conform to the applicable requirements of the Greenbook, Section 201, except as follows:

1. Water/cement ratio for concrete flatwork shall be 0.50 maximum.

2. Base course shall conform to Section 32 3226 Base Course.
3. Reclaimed concrete material shall not be used.

2.2 SKATEBOARD DETERRENTS

A. Manufacturer: Barrett Robinson Inc. or equal.
B. Fabricated from 6061-T6 aluminum, clear anodized.

EDIT NOTE: DELETE PRODUCTS NOT USED IN THE PROJECT.

1. Fixed Angle Series:

a. FR0.12: For walls with 1/8" radius edge. Dimensions: 4.875" top x 1.0" face x 2.0" wide.
b. FA90A: For walls with 1/8" radius edge. Dimensions: 4.0" top x 2.375" face x 2.0" wide.
c. FA135: For chamfered edges, where the chamfer is 3/4” or more. Dimensions: 2" wide X 3-1/2" long X 1-1/8" tall.
d. FA902.5: For 90 degree walls with 1/2" radius edge. Dimensions: 3.75" top x 2.375" face x 2.0" wide.

2. Fixed Radius:

e. FR.12: For 1/8" radiused edges. Dimensions: 4.875" top x 1.0" face x 2.0" wide.
f. FR.05: For 1/2" radiused edges. Dimensions: 3.75" top x 1.0" face x 2.0" wide.
g. FR1.0: For 1" radiused edges. Dimensions: 4.375" top x 1.625" face x 2.0" wide.

3. Gorilla Series:

h. Gorilla 012: Rounded edge. For square corners from 0” - 3/8” radius. Size: 1-1/8” wide x 8” deep x 1-1/8”.
i. Gorilla 0135: Chamfered edge. For square corners from 0” - 3/8” radius. Size: 1-1/8” wide x 8” deep x 1-1/8”.

4. Two-part epoxy adhesive shall be approved by the OWNER’s Office of Environmental Health and Safety (OEHS).
5. Fastening pins as recommended by skateboard deterrent manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that gradients and elevations of base are correct. Maintain subgrade clean and in a smooth, compacted condition until the concrete is placed.
B. Maintain subgrade in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. Earth surface shall be kept moist by frequent sprinkling up to the time of placing concrete.

3.2 CONSTRUCTION OF FORMS

A. Flatwork Forming: Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 4 stakes per form placed at intervals not to exceed two feet. Use additional stakes and braces at corners, deep sections, and radius bends, as required. Use clamps, spreaders, and braces where required to ensure rigidity in the forms.

B. Wall Formwork: Forms shall be constructed to conform to final concrete shape, lines and dimensions of members required by Drawings and Specifications. Forms shall be sufficiently tight to prevent leakage of concrete and properly braced or tied together to maintain position and shape.

3.3 STEEL REINFORCEMENT INSTALLATION

A. Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted.
B. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
C. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces, and lace splices with wire.
D. Clean reinforcement of loose rust and mill scale, earth, or bond-reducing materials.

3.4 PREPARATION FOR CONCRETE PLACEMENT

A. Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.
B. Do not place concrete until forms, reinforcement, pipe, conduits, outlet boxes, anchors, sleeves, bolts, and other embedded materials are securely fastened in place. Maintain a minimum of two inches clearance between said items and any part of the concrete reinforcement.
C. Adjust pull boxes, meter boxes, valve covers and manholes to proposed finish grade prior to placement of concrete. Anchor bolts shall be accurately set and maintained in position by templates while being embedded in concrete.
D. Clean thoroughly the surfaces of metalwork to be in contact with concrete, remove dirt, grease, loose scale and rust, grout, mortar, and other foreign substances before the concrete is placed.
E. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

3.5 CONCRETE PLACEMENT

A. Place, compact, screed, float and trowel concrete as indicated in Section 03 3000 Cast-in-Place Concrete.
B. Finish: After straight edging, when most of the water sheen has disappeared and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. Produce a scored surface by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

    1. Provide medium broom finish on surfaces up to six percent slope by striating surface 1/32 to 3/64 inch deep with a soft bristle broom across concrete surface to provide a uniform fine line texture.
    2. Provide heavy broom finish on surfaces over six percent by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom.

3.6 JOINTS

A. Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated. Align curb, gutter, and sidewalk joints.
B. Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour.

1. Continue steel reinforcement across construction joints unless otherwise indicated on the Drawings.
2. Provide tie bars at sides of paving strips where indicated on the Drawings
3. Butt Joints: Use bonding agent or epoxy-bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated on the Drawings.

D. Expansion Joints:

1. Provide premolded joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together. Extend expansion joint fillers full-width and depth of joint, and 1/4" below finished surface where joint filler is indicated. If no joint sealer is indicated place top of premolded joint filler flush with top of concrete or curb.
2. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints to a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Remove grooving-tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Remove edging-tool marks on concrete surfaces.

G. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. The hardened surface shall be cleaned of latent foreign material and washed clean, prior to the application of an epoxy bonding agent.

3.7 STAIRS AND RAMPS

A. Install support post sleeves into the perimeter concrete curbing during the installation process of the curbing. Sleeves shall be three-inch diameter, schedule 40 PVC with a cap solvent welded to the bottom of the sleeve. Drill a half-inch weep hole on the bottom of the cap. Sleeve and cap shall be Nibco products or approved equal. Sleeves shall be embedded into concrete a minimum of nine inches and spaced at a maximum of four feet, or as indicated on the Drawings. Fill sleeve with non-shrink grout Quickcrete #1585-01 when setting posts. Provide control joints into the concrete on both sides for each post.

B. Finish step nosings with a safety step edger/groover with a 1/2 inch radius and four grooves spaced equally 3/4 inch on center and a bit depth between 1/4 to 3/8 inch. Paint with contrasting color.

3.8 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

A. Formed Curb and Gutter: Place concrete to the required section in a single lift. Consolidate concrete using approved mechanical vibrators. Finish curve shaped gutters with a standard curb mule or concrete slip formed curb paving equipment.
B. Concrete Finishing: Float and finish exposed surfaces with a smooth wood float until true to grade and section and uniform in texture. Brush floated surfaces with a fine-hair brush using longitudinal strokes. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the front curb surface, while still wet, in the same manner as the gutter and curb top. Finish the top surface of gutter to grade with a wood float.
C. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

EDIT NOTE: REFER TO STANDARD TECHNICAL DRAWINGS A-460 AND A-461 FOR SYNTHETIC SURFACING RUNNING TRACK CURBS/BANDS.

3.9 TRACK AND FIELD CONCRETE WORK

A. Provide a Conformance Survey for concrete curbs, bands, drains, edge of paving dimensions and elevations in accordance with Section 32 1219 Asphalt Paving for Synthetic Running Track Surfacing.
B. Corrective Measures: Determine If the planarity, cross slopes, elevations or general specifications have not been met submit corrective measures for the ARCHITECT's and OWNER's review and approval. Once the corrective measures have been completed the track surfacing contractor shall submit a notification accepting the concrete work.

3.10 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project Site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 32 13 16 - CAST-IN-PLACE ARCHITECTURAL CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

Section Includes: Provide all labor, equipment and materials required for the finishing of decorative architectural concrete paving and walls as indicated on Drawings and as specified herein.

1.2 Related Sections:

1. Division 01 General Conditions and Special Project Procedures
2. Division 03 Site Concrete Work
3. Division 31 Earthwork and Grading
4. Division 32 Planting Irrigation.

1.3 RELATED DOCUMENTS

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

1.4 ACTION SUBMITTALS

A. Product Data: Each product indicated.

B. Sawcut Blades: Product Materials

C. Surface Retardants: Product Materials

D. Shop Drawings: Submit Shop Drawings indicating locations of cast-in-place concrete Work, reinforcing details, and accessory items such as edging, benches, curbs, joints, light fixtures, drains, etc. Include details and locations of embedded items, and interfacing with other Work.

1. Paving and Wall Jointing and Pour Sequence Plan showing the following:

a. Proposed layout of contraction, construction and isolation joints. Clearly delineate and detail the different joint types.

b. Layout of paving and wall types as indicated on Drawings. Give overall dimensions of each paving and wall type.

c. Identify finishes and textures of each paving and wall type in a legend and on the shop drawings.

E. Certificates: Submit a notarized certificate that each of following conforms to standards indicated:

Aggregates – ASTM Standards C33

1.5 QUALITY ASSURANCE

A. Comply with the following as a minimum requirements

American Concrete Institute (ACI) Publication:

ACI 301 including ACI 301-20

ACI 117 Tolerances for Concrete Construction

ACI Publication Placing and Finishing Decorative Concrete Flatwork CCS-5(16).

American Society for Testing and Materials (ASTM) Standards:

B. Installer Qualifications: An experienced installer who has completed decorative architectural concrete paving and wall finishing work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance. Provide written evidence to indicate successful experience in installing decorative architectural concrete paving of the finishes and texture specified for this project. Provide (5) projects totaling at least 75,000 SF within a 25 mile radius of project site. Provide (5) written recommendations from the Landscape Architect, Architect, or General Contractor regarding the quality and performance of the decorative concrete contractor on these projects. The written recommendations must be from at least (3) different projects. The decorative concrete contractor must have a minimum of (1) ACI Certified Flatwork Finisher and (1) ACI Certified Flatwork Technician on site during the construction of the project.

C. Pre-Installation Conference: See Section 03 30 00

D. Finish Samples

1. Paving Finish Samples: Contractor to prepare 12” x 12” Paving finish samples for approval by the architect. A set of samples shall be submitted showing each surface finish and finish specified. Up to 3 rounds of samples for each finish may be necessary in order to achieve the desired finishes. Control Sample: The Architect’s approved samples shall become the project control samples. All work shall match the finish, and consistency of the Architect’s control samples for each type of finish paving.

E. On Site Mock ups:

1. Three (3) mock ups for each type of concrete paving and wall shall be included in the Contractor’s bid. If the contractor is unable to construct mock ups acceptable to the Architect for each type of concrete paving the contractor shall be deemed unqualified for the work and a qualified replacement shall be secured at no additional cost to the Owner.

    a. If approved, samples may be retained as final construction. If rejected sample will be removed by the contractor at the contractor’s expense.

2. Paving

    a. Construct 8’ x 8’ minimum sample of each paving finish, demonstrating all surface finishes, textures, exposed aggregates, embedded materials, curing, joint types, saw cut patterns and quality of workmanship for approval on site.

        1. Surface Retarded Concrete:

            a. Light etch finish

3. Walls:

    a. Construct full size mock up of cast in place concrete wall finishes including embeds and surface attached elements. Finish sample to include smooth rubbed finish with grouting from existing moist surface cement paste, and typical patching and filing of holes over 1/8” diameter. Architect may request up to 3 samples of the rubbed finish demonstrating contractor’s

methods to achieve final approved finish. Walls to be a minimum of 3-feet long and once accepted, may remain in place with the Architect's approval.

1.6 TOLERANCES FOR CONCRETE PAVING

A. Variation from Plumb
   1. In the lines and surfaces of pavements:
      a. In 10 feet, maximum 1/4 inch
   2. For control-joint grooves and other conspicuous lines:
      a. In any 20 feet, maximum 1/4 inch
      b. In any 40 feet or more, 1/2 inch

B. Variation from the Level or from the Grades shown per Civil Engineer Drawings:
   1. ***In pavements:***
      a. In any 10 feet, 1/4 inch
      b. In 20 feet, maximum 3/8 inch
      c. In 40 feet or more, 3/4 inch
   2. ***For exposed joints and other conspicuous lines***
      a. In any 20 feet, maximum 1/4 inch
      b. In 40 feet or more, 1/2 inch

C. Variation in the Sizes and Locations of Sleeves and Wall Openings:
   1. Plus or minus 1/4 inch.

D. Variation in Cross-Sectional Thickness of Slabs:
   1. Minus 1/4 inch
   2. Plus 1/2 inch

E. Variation in Radii:
   1. In radii of less than 10 feet:
      a. In any 5 feet, 1/8 inch
      b. In any 10 feet, 1/4 inch
   2. In radii of 20 – 30 feet:
      a. In any 10 feet, 1/4 inch
      b. In any 20 feet, 3/8 inch
   3. In radii of 30 feet or more:
      a. In any 20 feet, 1/2 inch
      b. In any 30 feet, 1 inch

1.7 FINAL ACCEPTANCE

A. Review Date: Make a written request for review for Final Acceptance at least 5 working days in advance.

B. Completion: Work will be accepted upon satisfactory completion of all site concrete work.

C. Responsibility: Upon Final Acceptance, Owner will assume responsibility for maintenance of the work.

1.8 REJECTED MATERIALS:

A. Remove off the site all concrete that does not meet the requirements of the specifications.

1.9 JOB CONDITIONS

A. Hot Weather Requirements:

1. During hot weather, proper attention shall be provided for finishing, protection, sawcutting and curing, to prevent excessive concrete temperatures or water evaporation which could impair required strength or durability.

1.10 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate all items of other trades to be furnished and set in place. Coordinate proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades in ample time that progress of the work is not delayed.

B. Cutting/Patching: Not permitted.

PART 2 - PRODUCTS

2.1 WATER: Water shall be potable and free from deleterious matter complying with ASTM C 94/C 94M.

2.2 SURFACE RETARDANT: Spray Applied, film forming top surface retarder, calibrated for specific sized aggregates and finish requirements without the use of a plastic covering. Color-coded to allow for ease of application and verification of grade being used as well as even and complete coverage.

2.3 SAWCUT BLADES Saw BladeType: 3/16” Width Diamond Blade

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Review site conditions and related work. Notify the Architect in advance of any conflicts or conditions that are inconsistent with the contract documents.

3.2 INSTALLATION

A. Surface Drainage:

1. Provide for positive drainage on all concrete paving surfaces.
2. Report in writing any discrepancies or omissions on drawings and conditions on the site which would prevent proper drainage.
3. No "birdbaths" or other surface irregularities will be permitted. Properly correct irregularities.

3.3 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

C. Begin the second floating operation when bleed-water sheen has disappeared, and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging tool marks on concrete surfaces.

3.4 BROOM FINISHING: Broom, float and trowel finishes (Civil and Structural concrete).

3.5 SURFACE RETARDED FINISH

A. Surface retarded finish concrete. CONC-1, and CONC-2, on Landscape Drawings. after the concrete has set sufficiently cured, use clean water and a stiff broom to remove the retarded cement paste, washing thoroughly until the aggregates are uniformly exposed approximating the appearance of an acid-etched finish and the finish matches the approved sample panel by the Architect.

B. See Drawings for depth of “Top-Cast” etch.

3.6 CAST IN PLACE WALLS:

A. Rubbed Finish per ACI 301. Remove forms as soon as concrete is sufficiently hardened. Wet surface and rub with carborundum brick or other abrasive until uniform color and texture are produced. Fill all bug holes with wet cement paste from rubbing to achieve smooth and even vertical surfaces. Fill all holes, gaps or other voids to achieve smooth finish.

3.7 SAW CUT JOINTS:

A. General: Construct joints at right angles to centerline unless otherwise indicated.

1. Locations of Decorative Saw Cut Joints: See Drawings.
2. Depth of Saw Cuts: 1/4 of slab depth, completed within 24 hours of concrete placement.
3. Width of Saw Cut Joints: Maximum width shall be 3/16”
4. Perform all sawcutting with diamond tip circular saws. Construct all Saw cut joints in a straight line with no overcutting. Extend all saw cuts to the end of each concrete panel.
5. Do not overlap cuts into adjacent concrete panels.
6. Do not allow saw cut jointing to deviate more than (+/-) 1/16 inch overall in a 10 foot run.
7. Use a hand tool to saw cut up to vertical edges such as walls, steps, curbs and columns., No cutting into vertical surfaces will be allowed.

3.8 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area 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.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Landscape Architect.

3.9 Curing: See Section 03 30 00 Cast in place Concrete.

3.10 CLEAN UP

1. Remove rubbish, debris and waste materials immediately and legally dispose of off the Project site.

3.10 PROTECTION

A. Protect the Work of this section from construction activities and traffic until Substantial Completion.

END OF SECTION

SECTION 32 17 23 - PAVEMENT MARKINGS AND WHEEL STOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pavement markings and wheel stops on concrete and asphalt (AC) paving.
B. Related requirements: Division 09 for other field painting.

1.2 SUBMITTALS

A. Data: Manufacturer Product Data

1. For precast wheel stops.
2. For paint.

B. Samples: Samples of each paint color, 8-1/2-inch by 11-inch.
C. Shop Drawings for all site vehicular traffic and parking areas. Minimum acceptable scale of Shop Drawings is 1/8-inch per foot. Show the following.

1. Vehicular drive aisles, traffic arrows, traffic symbols, disabled access striping, disabled access symbols, road surface lettering, walking paths, and complete dimensions.
2. Painted and unpainted curbs.
3. Sidewalks.
4. Location of truncated domes. Specifies in Section 31 17 24.
5. Parking stripes. Accurately show widths of all paint stripes, with pairs of lines spaced to depict the width of each stripe. Include a legend for all paints proposed for use.
6. Locations of wheel stops.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Striping Paint: One of the following, or equal.

1. “Krylon Line-Up Pavement Striping Paint” by Krylon Products Group.
2. “All Weather Pavement Marking Paint” by 3M.
3. “Vin-L-Stripe W-801”by Dunn Edwards Corp.
4. “Parking Lot Paint” by Diamond Vogel.
5. “Traffic Zone Paint B46 Series” by Sherwin-Williams.

B. Correcting paint: “Black Overstripe” by Centri, or equal.
C. Paint colors:

1. Accessibility markings: Match No. 15090 in Federal Standard 595C as specified in Section 2-1720 of CCR Title 24 Accessibility Regulations.
2. No Parking Zone Markings: Yellow.
3. No Parking Curbs: Red.

4. All other locations: White.

D. Wheel stops:

1. Standard precast concrete units formed of 3,000 psi (minimum) concrete reinforced with two No. 3 deformed bars.
2. Exposed surfaces shall be dense and smooth, free of honeycombs.
3. For all wheel stops, provide with 2 symmetrically spaced holes for anchors.

2.2 WHEEL STOP ACCESSORIES

A. Anchors: 3/4-inch I.D. galvanized pipe or #5 concrete reinforcing bar by 18-inch long.
B. Epoxy adhesive: 2-part adhesive suitable for adhering concrete-to-concrete by one of the following.

1. Delta Plastic Co.
2. Futura Co. Ltd.
3. Sika Chemical Co.
4. Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions and measurements affecting the work of this Section at site.
B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

A. Remove dust, debris, curing and sealing compounds, and other foreign substances detrimental to epoxy adhesive and paint bond. Use a commercial degreasing solution to remove grease and oil.
B. Take field measurements and make layouts required.
C. Erect temporary barriers, and signs, and leave them in place until the paint has thoroughly dried.

3.3 PAVEMENT MARKINGS

A. Allow newly resurfaced pavement surfaces to cure for not less than 30 days before applying marking materials.
B. Provide guide lines and templates necessary to control paint application.
C. Mix and apply paint in compliance with its manufacturer’s instructions and to the approved layout.
D. Paint accessibility marking at each accessible parking space. Apply 700 square-inch International Accessibility Symbol on pavement in accordance with CBC Title 24 Section 2. Paint white symbol on blue square background.
E. Separate each parking space by a pair of closed double lines 4 inches wide typically, unless otherwise indicated.
F. Make all other lines uniform 4-inch wide, unless otherwise indicated.
G. Provide hairpin stripe hatching between accessibility parking stalls as required by Code.
H. Make work straight or curved as indicated, of uniform color and texture with edges parallel, clean, sharply defined and accurate, without overspray.

I. Thickness of cured paint film shall be 15 mils minimum, but not less than required for complete opacity.

J. Tolerances: Striping dimensions are nominal. Tolerances are as follows:

1. Parking space lengths: Within 2 inches of dimensions indicated.
2. Parking space widths: Within one-inch of dimensions indicated.
3. Base line length: Within one-inch of dimensions indicated.
4. Stripe width and geometry for curved lines: Within one-quarter-inch of dimensions and geometry indicated.
5. Total overall string baseline dimensions: Within 2 inches of dimensions indicated.

3.4 WHEEL STOPS

A. General:

1. Examine each wheel stop and reject those damaged.
2. Install wheel stops in the locations shown, in even alignment over clean and dry surfaces.

B. On concrete:

1. If paving is irregular, level with a mixture of adhesive and sand before installing the wheel stops.
2. Apply adhesive in accordance with the adhesive manufacturer’s instructions. Provide a bond of 75 percent minimum of contact surface, and in accordance with the adhesive manufacturer's instructions.
3. After adhesive is dry, drill concrete and anchor wheel stops by driving anchors into the concrete, flush with the top of the precast unit.

C. On asphalt concrete:

1. Anchor to subgrade by driving 2 anchors flush with the top of the precast unit.
2. Use caution not to damage the wheel stop when driving the anchors.

D. Replace damaged units.

3.5 CORRECTIVE WORK

A. Touchup defective markings by painting over the errors with paint of the same color as the pavement. Correct deviations in pavement markings greater than tolerances specified and re-apply correctly.

B. The Architect may, at his option, require sandblasting of the markings if the errors are significant.

END OF SECTION

SECTION 32 17 26 - TACTILE WARNING SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Surface-mounted truncated dome tiles.
2. Fasteners, adhesives, sealants and other miscellaneous materials and accessories required for complete, ADA-compliant installations.

1.2 SUBMITTALS

A. Samples: Submit four full-size squares of each tile type and color, and four 12-inch squares of each panel type and color, glued to hardboard backing.
B. Maintenance: Furnish the Owner copies of the material manufacturer recommended maintenance products, and recommended maintenance methods and procedures.

1.3 QUALITY ASSURANCE

A. Comply with the following:

1. ADA Accessibility Guidelines for Buildings and Facilities.
2. ADA Regulations for Detectable Warning on Curb Ramps.

B. Fire-test-response characteristics:

1. General: Provide products with the following fire test response characteristics.
2. Critical radiant flux: 0.45 watts/sq. cm or greater when tested in accordance with ASTM E 648.
3. Smoke density: Maximum specific optical density of 450 or less when tested in accordance with ASTM E 662.

C. Certification: Certification attesting that materials meet Specification requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance: Palletize and shrink-wrap units and deliver in original unopened packaging with legible manufacturer identification, including size, piece number, quantities, manufacturer date and inspector initials.
B. Storage and Handling: Store materials indoors, sheltered from moisture in original packaging. Protect from damage.

1.5 WARRANTY

A. Warrant work of this Section for 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract.

B. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of the Architect and at no expense to the Owner. Defects include but are not limited to; cracks, chalking, spalling, separation and blistering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. ADA Solutions, Inc. (basis of design.)
B. Wausau Tile, Inc.
C. Or equal.

2.2 MATERIALS

A. Tile: Colorfast and UV stable homogenous glass and carbon reinforced composite, complying with the following:

1. Compressive Strength: 28,900 psi, ASTM D 695.
2. Flexural Strength: 29,300 psi, ASTM D 790.
3. Water Absorption: .07%, ASTM D 570.
4. Slip Resistance: 1.18 Dry, 1.05 Wet, ASTM C 1028.
5. Flame Spread Index: 20, ASTM E 84.
6. Salt Spray: No Change (200 hours), ASTM B 117.
7. Chemical Stain Testing: No Deterioration, ASTM 1308.
8. Abrasion Resistance: 549, ASTM C 501.
9. Accelerated Weathering: Delta E<5.0 (2,000 hours), ASTM G 155.
10. Tensile Strength: 11,600 psi, ASTM D 638.
11. Load Bearing at 16,000#: No Damage, AASHTO - H20.
12. Freeze/Thaw/Heat: No Disintegration, ASTM C 1026.
13. Color: Yellow - FS33538 of Federal Standard 595C.
14. Tile dimensions:
    a. Sizes as indicated on the Drawings.
    b. Nominal 0.375 inch thick.
    c. Provide edge transition detail complying with 11B-303 of the CBC.
15. Raised truncated dome geometry: Comply with 11B-705.1.1 for the following:
    a. Dome Size.
    b. Dome Spacing.
    c. Color and Contrast.
    d. Resiliency.
16. Locations: As shown on Drawings.

B. Fasteners: 1/4-inch by 1-5/8-inch, yellow composite sleeve anchors with stainless steel pins.
C. Adhesive: One-component yellow urethane structural adhesive recommended by tile manufacturer.
D. Sealant: Sonneborn NP1, Sikaflex 1A, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify the Architect in writing of any conditions which would be detrimental to the installation, including, but not limited to the following:

1. Defects in existing work.
2. Deviations beyond allowable tolerances for the substrate.

B. Corrected defects before proceeding with installation.

3.2 INSTALLATION

A. Adhesive setting: Set accurately in adhesive in accordance with tile manufacturer’s instructions.
B. Mechanical fastening:

1. Install fasteners in pre-formed fastener locations. Place fasteners in hole and hammer into place.
2. If additional fasteners are required, use a 1/2-inch six-point, 82 degree countersink to add a new fastener location.

C. Align units straight and true with variations not exceeding 1/8 inch in length, height or width.
D. Caulk around perimeter of each complete installation with the specified sealant.

END OF SECTION

SECTION 32 80 00 - IRRIGATION SYSTEM

PART ONE – GENERAL

Website: http://eng2.lacity.org/brownbook/frame.cfm

1.1 DESCRIPTION

A. Work Included:

1. All labor, materials, equipment, appliances, fixtures and tests necessary for complete [demolition of existing irrigation system and a] new operating irrigation system as indicated on the Contract Drawings.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS in DIVISION 1 - GENERAL REQUIREMENTS and other Sections of the Project Manual.

2. Site Clearing and Grubbing in Section 31 11 00.

1.2 SUBMITTALS

A. The Contractor shall make all required materials submittals in accordance with Article 10 of the General Requirements. Far all materials not approved upon the first submittal, Contractor is responsible to promptly resubmit for approval, necessary data concerning a substitution for a disapproved item or piece of equipment.

B. The Contractor shall make substitution submittals in accordance with Article 11 of the General Requirements.

C. Submit copies of the following:

1. Complete list of irrigation materials and miscellaneous hardware complete with descriptions and/or photographs and manufacturer’s literature. Clearly mark or underline proposed items.

1.3 QUALITY ASSURANCE

A. Codes and Regulations: Contractor shall obtain and pay for all required permits. Deliver all permits and submit certifications of compliance to the BCA Inspector and the Project Manager.

1.4 GENERAL REQUIREMENTS

A. Approvals by the Engineer: Before commencement of irrigation installation, Contractor shall obtain:

1. All approvals on required submittals hereinafter specified.

2. Approval of all re-submittals requested by the City Engineer.

3. Contractor shall make a detailed staked layout on the work site of the proposed trenching locations for all mainline, control wire conduit, and valve manifolds for approval by City Engineer prior to trenching.

4. Contractor shall make a detailed staked layout on the work site of the proposed head locations for approval by City Engineer prior to lateral line trenching.

B. Required Inspections: Notify the City Inspector at least 72 hours prior to time of required inspection.

1. IRRIGATION MAINLINE PRESSURE TEST: The pressure test shall take place under the direction of the BCA Inspector.

2. IRRIGATION COVERAGE TEST: After installation of heads and lateral lines etc., entire irrigation system shall be tested for coverage. Contractor shall notify the BCA Inspector, Project Manager, Landscape Architect and designated Recreation and Parks Regional maintenance staff three (3) days before the scheduled test.

C. Existing Utilities and Plant Materials: Protect utilities and/or plant materials not designated for removal or modification in place against damage resulting from work of this Contract. Perform any removal and/or modifications only on approval or instruction from the City Engineer or in accordance with applicable provisions noted or specified.

D. Verification of Dimensions and Quantities: Verify site conditions, contract drawings, all dimensions and quantities prior to the bid. Furnish the quantities as necessary to do the specified work. Notify the Project Manager of any discrepancies between the Contract Drawings and the site conditions prior to beginning work. Do not work in areas where such discrepancies occur until further instruction by the City Engineer.

E. Record Drawings: Comply with provisions of the General Requirements. Contractor shall accurately dimension the location and depths of all piping, valves, and control equipment as installed. Indicate with suitable colored ink on one set of prints of the Contract Drawings to produce a record of complete installations to be kept on the job and up-to-date at all times during construction. At the completion of the work and prior to Final Inspection, the Contractor shall copy his record "as installed" data, using red ink, onto a set of clean prints. The Contractor shall certify to the completeness and accuracy of the "as installed" information indicated on the prints with his signature, and deliver the signed prints to the Project Manager for review prior to the completion of the Plant Establishment Period.

Dimension from two permanent points of reference, building corners, sidewalk, or road intersections, the location of the following items:

1. Connection to existing water lines.
2. Connection to existing electrical power.
3. Gate valves.
4. Routing of all pressure lines. Indicate dimensional location at 100' intervals.
5. Irrigation control valves.
6. Routing of control wiring.
7. Quick coupling valves.
8. Controller.

9. Other related equipment as directed by the Architect.
10. Sleeve locations.

F. Water and Power Services: Upon award of contract, the Contractor shall contact the Department of Water and Power to arrange and pay for the installation of all required water [and electrical] meters and services. Service connections shall be as shown on the Contract Drawings or as designated by the utility company. Upon final acceptance of the project, the Contractor shall transfer billing to the City of Los Angeles, [Department of General Services] [Department of Recreation and Parks] as directed by the Project Manager.

G. Guarantee: In accordance with provisions of the GENERAL CONDITIONS, contractor shall guarantee the entire irrigation system against defects in materials and workmanship for a period of one year from the date of final acceptance of the Project.

1. The entire irrigation system shall be warranted to be free from defects in materials and workmanship, and installed in accordance with the irrgation plans, specifications and the SSPWC. The Contractor shall be required to repair or replace any defects in material or workmanship which may develop within one (1) calendar year from the date of acceptance, excepting ordinary wear and tear and unusual abuse or neglect. Further, the Contractor shall be required to make any necessary repairs within 48 hours of notification at no cost to the City. If the Contractor or his agent fail to make such repairs within the stipulated time, the City shall make such repairs or have repairs made by a third party and bill the Contractor for all expenses that accrue from making such repairs.

2. The City reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the City will not relieve the Contractor of his responsibilities under the terms of the guarantee.

3. Contractor shall repair any settlement of backfilled trenches which may occur during a one year period after final acceptance by the City Engineer, to the City Engineer's satisfaction, without expense to the City, including the complete restoration of all damaged planting, paving, or other improvements of any kind.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver products to the job-site in their manufacturer's original containers, with labels intact and legible.

B. Storage: Store piping, materials, fitting, etc. at the job-site where directed by the City Engineer until such time for installation.

C. Handling: Promptly remove damaged materials and unsuitable items from the job-site and promptly replace with materials meeting the specified requirements, at no added cost to the City.

PART TWO - PRODUCTS

2.1 MATERIALS

A. General: Provide recently manufactured materials of the best grade of each respective kind.

B. Pipe and Fittings: The type of pipe material and fittings designated on the Contract Drawings, or as hereinafter specified shall be:

1. Steel Pipe: Galvanized standard weight Schedule 40 steel water pipe complying with ASTM A53 - SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT-DIPPED, ZINCH-COATED, WELDED AND SEAMLESS; jointed with galvanized, threaded, standard weight malleable iron fittings, and/or couplings.

2. Plastic Irrigation Pipe: High impact rigid polyvinyl chloride PVC 1220 (Type I, Grade 2), conforming to ASTM D1785 - SPECIFICATION FOR POLY (VINYL CHLORIDE) (PVC) PLASTIC PIPE, SCHEDULES 40 & 80 and CLASS 200. The minimum pressure rating to be not less than indicated therein for the schedule and size listed.

3. DOMESTIC WATER LINES FOR DRINKING FOUNTAINS: Install water piping in accordance with the latest edition of the Uniform Building Code and all local ordinances. Prior to allowing human consumption of water from newly installed drinking fountains the contractor shall perform domestic sterilization procedures as indicated in applicable details and provide testing results to document compliance with the standards indicated. New drinking fountains shall be turned off or otherwise made inoperable until this testing is successfully completed and approved.

   a. Domestic Cold Water Piping ABOVE GRADE: Piping shall be ASTM B88 Type “L” seamless hard drawn copper tubing with ANSI B 16.22 wrought copper fittings. Joints shall be made up with lead-free, nickel bearing alloy solder such as Harris Bridget.

   b. Domestic Cold Water Piping BELOW GRADE: Piping shall be ASTM B88 Type “K” seamless hard drawn copper tubing with ANSI B 16.22 wrought copper fittings. Joints shall be made up with lead-free, nickel bearing alloy solder such as Harris Bridget.

4. All Pipes: Shall be homogeneous throughout and free from cracks, holes, foreign materials, blisters, deleterious wrinkles, and dents.

5. Solvent-welded Schedule 40 PVC plastic pipe and fittings shall be used for pipe sizes up to and including 2½ inch for installation of irrigation pressure lines and lateral lines.

6. Class 200 PVC gasketed pipe with ductile iron fittings and restraints as detailed on Contract Drawings shall be used for continuously pressurized pipe of sizes of 3-inch up to and including 6-inch diameter.

7. Schedule 80 PVC plastic pipe and threaded fittings shall be used only when threaded joints are specified, or otherwise permitted by the City Engineer.

8. All piping shall be permanently marked with the following: Manufacturer's name or trademark, size, schedule, and type of pipe, working pressure at 73 degrees F. and National Sanitation Foundation (N.S.F.) approval.

9. Ductile iron fittings for restrained plastic pipe shall be manufactured of ductile iron, Grade 65-45-12 in accordance with ASTM A536. Fittings shall have deep bell push-on joints with gaskets meeting ASTM F477. All ductile iron fittings shall be manufactured by HARCO Fittings, or approved equal.
   http://www.harcofittings.com

   a. Valve to pipe restraints shall consist of ductile iron (ASTM A536) grip rings with machined serrations and ductile iron restraint rods. The ring that grips the pipe

shall meet the requirements of UNI-B-13-94. The restraint rod nuts shall be made from low alloy steel to AWWA/ANSI C111/A21.11 or ductile iron to ASTM A536.

b. Fitting to pipe restraints shall allow the full rating of the pipe on which it is used. Grip rings and restraint structures shall be made of ductile iron to ASTM A536. Grip ring serrations (gripping features) shall be fully machined or cast. Clamp bolts and nuts shall meet or exceed ASTM A307.

c. Pipe to pipe restraints shall allow the full rating of the pipe on which it is used. Grip rings and bell rings shall be made of ductile iron to ASTM A536. Grip ring serrations (gripping features) shall be fully machined or cast. Restraint rod nuts shall be of low alloy steel to AWWA/ANSI C111/A21.11. Clamp bolts and nuts shall meet or exceed ASTM A307. Pipe to pipe restraint shall meet or exceed the full rating of the pipe on which it is used.

10. Gasket lubricant for push on fittings shall be non-toxic, odorless, tasteless and shall not support bacteria. Use 'Seal Lube", SK#87710 by IPS Weldon Corp. or equal.

C. Valves and Valve Boxes:

1. General: Provide valves of the type and capacity designated on the Contract Drawings and with the requirements specified herein. All valves shall be capable of continuous performance at a working pressure of 200 psi or less.

2. Gate Valves and mainline isolation Valves: *in sizes 2.5-inch and smaller* shall be bronze type, non-rising stem, solid wedge gate valve; Nibco T-113-LF or approved equal.

3. Mainline isolation Valves: *in sizes 3-inch and larger* shall be Nibco #P-619-RW IPS PVC push-on type resilient wedge cast iron gate valve with electrostatically applied fusion-bonded epoxy 8-20 mil. thick inside and outside, or approved equal.

4. Automatic Control Valves: Electrically operated, cast brass or bronze normally closed globe valve, capable of with manual flow control adjustment and manual operation capability, readily disassembled for servicing, slow opening and closing, and self-flushing. Reclaimed water compatible. Rainbird EFB-CP Series or Toro 220 series, or approved equal.

5. Quick-Coupling Valves: shall be 1" type with two-piece red brass construction with a locking thermoplastic rubber cover. The Contractor shall provide one quick coupler key with hose swivel for each five quick couplers installed. Rainbird model #44LRC or approved equal.

6. Valve Boxes and Covers: Valve boxes shall be of Portland Cement concrete with a cast iron frame and hinged double toggle locking cover. The inside dimensions of the box shall be 10-1/2 inches by 17-1/4 inches, Model 363 1/2 HFL by Eisel Enterprises Inc., or approved equal. The cast iron cover shall be permanently embossed as follows (paint is not acceptable):

Gate Valve	GV	
Remote Control Valve		RCV
Quick Coupler Valve		QC
Master Valve	MV	

Flow Meter FM

Contractor shall supply one (1) valve box cover key for each five (5) valve boxes installed. Provide a minimum of two (2) cover keys, (800-2.2.7). Boxes are to be installed per the applicable details.

D. Backflow Prevention - Reduced Pressure Zone Assembly and Wye Strainer:

1. The Reduced Pressure Zone Assembly shall consist of two independently operating, spring loaded, “Y” pattern check valves and one hydraulically dependent differential relief valve. Mainline valve body and caps including relief valve body and cover shall be lead-free cast copper silicon alloy. Check valve and relief valve components shall be constructed so they may be serviced without removing the valve body from the line. Shutoff valves and test cocks shall be full ported ball valves.

   The assembly shall be rated to 175psi working pressure and water temperature range from 32°F to 140°F. The lead-free* Reduced Pressure Zone Assemblies shall comply with state codes and standards, where applicable, requiring reduced lead content. The assembly shall meet the requirements of AWWA Standard Code C511; and approved by the Foundation for Cross-Connection Control and Hydraulic Hydraulic Research at the University of Southern California. The Reduced Pressure Zone Assembly shall be Febco LF825Y, or approved equal.

2. Wye-Strainer: The main body shall be low lead bronze (ASTM B 584), the access cover shall be low lead yellow brass (ASTM B 16) or cast bronze (ASTM B 584), the strainer screen shall be 300 series stainless steel #100 mesh. Screens shall be accessible for cleaning without removing the device from the line. The “Y” type strainer shall be a ZURN WILKINS Model YBXL-100, or approved equal.

3. Backflow enclosure: shall be of a vandal resistant nature manufactured of formed cold rolled steel tubing and rod, coated with a performance polymer alloy. All locking and mounting hardware shall be manufactured entirely of stainless steel. Each enclosure shall have amounting pad which shall be used as installation frame. Enclosure hardware on the mounting frame shall be stainless steel. The backflow cage enclosure shall remain bolted to frame in open and closed positions. Enclosure and door shall close with concealed locking tab with hole to accept padlock. Enclosure shall be powder-coated dark green. By Strongbox, SBBC-CR series or approved equal. https://strongbox.com

E. Irrigation Heads:

1. Pop-up spray head: bodies shall have a 4”, 6” or 12” pop-up stroke. The body of the spray head shall be constructed of corrosion and UV-resistant, heavy-duty A.B.S. The spray head body shall have a factory-installed drain check valve capable of checking up to 10 feet in elevation change. The spray head body shall have a standard pressure-regulating device as an integral part of the pop-up riser maintaining a constant nozzle outlet pressure of 30 or 45 PSI with inlet pressures of up to 100 PSI. Nozzles shall be matched precipitation rate, fixed spray or multiple-stream, rotating type or other as noted on Contract Drawings. As manufactured by Rainbird Corporation, Toro Company or approved equal, models # 1804, 1806, 1812, or 1845.

2. Pop-up Gear Driven Rotor Head: The body of the rotor head shall be constructed of corrosion and UV-resistant, heavy-duty A.B.S. The rotor head body shall have a factory-installed drain check valve capable of checking up to 10 feet in elevation change. The full

or part-circle rotor head shall be a single stream, water lubricated, gear drive type capable of both full circle and/or part circle operation in the same unit as noted on Contract Drawings. The rotor head shall have a screen attached to the drive housing to filter inlet water, protect the drive from clogging and simplify its removal for cleaning and flushing of the system. The rotor head body shall have a 1” (26/34) female (NPT or BSP) bottom inlet. The rotor head shall have a standard rubber cover which designates each adjustment opening from the top. Pop-up height as measured from the top of the cover to the centerline of the nozzle orifice shall be at least 5 inches.The rotor shall have a stainless steel covered nozzle turret and riser stem. As manufactured by Rainbird Corporation or the Toro Company or approved equal.

3. Root Watering System: The RWS assembly shall consist of a perforated polyethylene rigid mesh cylinder 18” long x 4” diameter or 10” long x 2” diameter with an integrated pressure compensating bubbler and optional check valve. The assembly shall be preconfigured with swing joint assembly or spiral barbed fittings to enable the RWS to be directly connected to PVC or polyethylene lateral drip lines, and shall have a plastic locking grate cover. Manufactured by Rainbird Corporation, or approved equal.

4. SA Swing Joint Assemblies: The Swing Assemblies shall be used as a flexible swing joint assembly for 1/2” inlet sprinklers. The pipe shall be flexible black tubing constructed of linear low density polyethylene material with a wall thickness of 0.090”and an inside diameter of 0.490”.The fittings shall be constructed of UV-resistant, thermoplastic material. The Swing Assembly shall have an operating pressure rating of 80 psi at 110° F. As manufactured by Rain Bird Corporation, Glendora, California or approved equal.

5. TSJ (PRS) Swing Joint Assemblies: The swing joints shall be used as a height adjustable connector between lateral lines and 3⁄4" or 1" sprinklers or quick coupler valves. The swing joint shall be molded from rigid PVC, Type 1, cell classification 12454-B, conforming to ASTM D1784, with a pressure rating of 315 psi at 73° F when tested in accordance with ASTM D3139, including 60 minutes at 790 psi, and short term exposure of 1000 psi without leakage. All NPT threads, sockets, and spigots shall be Schedule 80 per ASTM D2464 and D2467. All components shall be factory preassembled, available with 3⁄4” or 1" inlet/outlet and in lengths of 12” and 18". All rotating joints shall be modified stub ACME threads. All rotating joints shall have two EPDM rubber O-rings for positive sealing and thread protection.

   The pressure regulating system (PRS) shall consist of the outlet elbow of a Rain Bird Turf Swing Joint (TSJ). The TSJ-PRS shall allow pressure to increase uniformly within the rotor up to the preset regulation pressure before regulation occurs. Pressure regulation shall be provided to rotors with 3⁄4" and 1" inlets by means of a spring-loaded diaphragm attached to a flow tube. The regulator housing shall be constructed of high strength PVC. All metal components shall be made of stainless steel. The diaphragm shall be a fabric reinforced elastomer.

F. Landscape dripline: Shall be a flexible, copper-colored polyethylene tubing with factory-installed pressure-compensating, inline emitters spaced evenly per listed spacing. The flow rate from each installed inline emitter shall be 0.4, 0.6 or 0.9 gph when inlet pressure is between 20 and 60 psi.The inline emitter shall have Copper Shield Technology installed to protect the emitter from root intrusion and be raised off the inside tube wall to minimize dirt intrusion. It shall have an automatic check valve that will seal the line at 4.3 psi.The inline emitter shall have a pressure-regulating diaphragm with a spring action allowing it to self-rinse if there is a plug at the outlet hole. Rainbird XFS-CV dripline inline tubing manufactured by Rain Bird Corporation or approved equal.

[FOR RAINBIRD 2-WIRE CONTROLLER USE BELOW:]

G. Automatic Irrigation Controller: The Controller shall be of a type that combines fully automatic or manual operation with an interface to a two-wire path for decoder- based irrigation control. The controller shall provide flow sensing capability and management and a 50 station capacity expandable to 200 stations. The controller shall allow up to 8 valves to operate simultaneously per program and total for the controller including the master valves. The controller shall incorporate a FloManager feature providing real-time flow, power, and station management. FloManager shall manage the number of stations operating at any point in time based on water source capacity, station flow rate, number of valves per station, and shall incorporate the ability to provide station priorities to determine the order in which stations shall operate. The Flow Smart Module shall accept sensor decoder input from 1 - 5 flow sensors with no flow scaling device required. Controller shall include a FloWatch Learn Flow Utility which learns the normal flow rate of each station and compares the current real-time flow rate to the learned rate and takes user-defined actions if high flow, low flow, or no flow is detected. FloWatch shall automatically determine the location of the flow problem and isolate the problem turning off the affected station(s) or master valve(s). FloWatch shall be compatible with both normally closed and open master valves. A Manual Master Valve Water Window shall be provided to coordinate daytime manual watering with the flow sensing. This Water Window shall offer programmable days of the week and manual watering additional flow rate. The controller shall have features and modular options that include: ET Manager Smart Cartridge, NCC Network Communication Cartridges, and the PBC-LXD Programming Backup Cartridge. ESP-LXD, manufactured by Rain Bird Corporation or approved equal.

1. The automatic controller shall be enclosed in a Heavy Duty Stainless Steel Top Entry Enclosure model SB-22SS by Strongbox or approved equal.

2. Valve decoders: shall be Rainbird FD-TURF Series 2-Wire Decoders for ESP-LXD Two-Wire Decoder Systems with Support for 1, 2, 4, or 6 Decoder Addresses, models FD-101TURF, FD-102TURF, FD-401TURF and FD-601TURF as indicated in the Contract Drawings. Sensor decoder shall be Rainbird SD210TURF sensor decoder. Install and connect to 2-wire path per manufacturer's instructions and as indicated in the Contract Drawings. All decoders must be manufactured by SAME manufacturer and compatible with the 2-wire controller system.

[FOR RAINMASTER 2-WIRE CONTROLLER USE BELOW:]

G. Automatic Controller Unit: The Controller shall be capable of fully automatic or manual operation with an interface to a two-wire path for decoder-based irrigation control. The controller shall provide flow sensing capability and management and a station capacity expandable to 200 stations. Controller shall include: automatic Et calculations and The ability to use any of four different Et sources as the basis for Et calculations; Cycle-and-Soak or conventional start times; Four independently controlled programs with 5 selectable start times for a total of 20 possible cycles per day or Cycle-and-Soak with unlimited start times; Flow sensing capability to monitor system flow and responds to high, low, unscheduled and no-flow conditions; Detection of valve wiring faults and automatic field wire detection enabling the controller to sense a short in the field wire and instantly turn off that station; Optional internet control via wireless cellular communication; manufactured by Rain Master Control Systems or approved equal.

1. The automatic controller shall be enclosed in a Heavy Duty Stainless Steel Top Entry Enclosure model SB-22SS by Strongbox or approved equal.

2. Valve decoders: shall be Rainmaster TW-D-1 Single valve AC decoder, TW-D-2 Dual valve AC decoder, TW-D-4 Quad valve AC decoder, TW-LA-1 Lightning arrestor (every 600 feet) as indicated in the Contract Drawings. Install and connect to 2-wire path per manufacturer's instructions and as indicated in the Contract Drawings. All decoders must be manufactured by SAME manufacturer and compatible with the 2-wire controller system specified.

3. Sensor wire: provide per manufacturer's requirements, and install in conduit per below.

[FOR 2-WIRE SYSTEMS USE BELOW:]

H. Control Wire:

1. Connection between the automatic controller and the valve decoders shall be made with polyethylene double-jacketed or UF-B UL PVC double-jacketed two-conductor solid core wire designed for direct burial with insulation 3/16 inch (.060") thick, high density, sunlight resistant incased in an outer jacket of Polyethylene or PVC conforming to ICEA S-GL-402 or NEMA WC5, having a minimum wall thickness of .045 inches. Two-wire Polyethylene 'twisted' cable and single strand 14 gauge PVC coated irrigation wire are not acceptable.

2. 2-WIRE Conductor SIZING: Standard wire lengths for straight line installation i.e. wire distance to the furthest device without any loop:

Wire Size(gauge)	#14	#12
Total loop Length	10,000'	14,800'
Distance to furthest valve	5,000'	7,400'

3. All 2-wire conductors shall be installed in a 1-1/4" diameter sch. 80 PVC conduit per details. Distance between pull boxes shall not exceed 200'.

4. Low voltage control wire conductors between the 2-wire decoders and the valves shall be U.L. approved direct burial Type U.F., 600 volt, No. 14 AWG solid copper. Use a different color wire for each valve in the manifold grouping.

[FOR STANDARD WIRING SYSTEMS USE BELOW:]

H. Control Wire:

1. Connection between the automatic controller(s) and the remote control valves shall be made with direct burial 14 gage, AWG-UF, 600 volt, copper wire. Wires shall be color coded as follows:

CONTROLLER WIRE COLOR	CONTROLLER STATION	CONTROLLER STATIONS	CONTROLLER STATIONS	CONTROLLER STATIONS
RED	1	11	21	31
YELLOW	2	12	22	32
BLUE	3	13	23	33

GREEN	4	14	24	34
ORANGE	5	15	25	35
TAN	6	16	26	36
PURPLE	7	17	27	37
PINK	8	18	28	38
BROWN	9	19	29	39
GRAY	10	20	30	40

CONTROLLER	TAPE BUNDLE COLOR
A	RED
B	YELLOW
C	BLUE
D	GREEN
E	WHITE
F	BLACK

I. Wire Connectors: Control wire connections shall be made with 3-M brand of DBY or DBR Direct Burial Splice kits, or approved equal. The splice kit shall consist of a one-piece malleable plastic bulb body with internal locking fingers, filled with re-enterable gel sealant and a Scotchlok Electrical Spring Connector. Materials shall be as follows:

1. Connector shall be a flame retardant PVC insulator with a steel spring and shell within. Connector shall be a non-crimping system

2. Tube material shall be clear see-through polypropylene.

3. Gel material shall be hixotropic calcium organic complex.

4. Wire sizes and numbers of wires per connector shall be as follows:

Connector:	Color:	No. and Size of Wires:
3M Model DBY	Yellow	Max. 4-12 gage UF wires
3M Model DBR	Red	Max. 3-14 gage UF wires

J. Concrete Thrust Blocks: Provide concrete thrust blocks per details where applicable for plastic pipes with 3" inch diameter or larger, and all backflow preventer assemblies. The portland cement concrete used for concrete thrust blocks shall be 470-B-2000 concrete.

PART THREE - EXECUTION

3.1 SURFACE CONDITIONS

Examine the area of work and conditions under which work of this Section will be performed. Correct any conditions detrimental to timely and proper completion of the work prior to commencing installation of irrigation equipment.

3.2 IRRIGATION SYSTEM INSTALLATION:

A. General:

1. The Irrigation system layout shown on the Contract Drawings shall be considered as diagrammatic. The Contractor shall make adjustments where necessary to conform to actual field conditions unless otherwise noted or as directed by the City Engineer at no additional cost to the City.

2. All piping shown on the Contract Drawings in paved areas but running parallel and adjacent to planted areas, is done for clarity only and is to be installed inside the planting area whenever possible.

3. Specimen trees (24-inch or larger size box) may be planted before installing the irrigation system upon written approval from the Project Manager. Contractor shall re-route irrigation lines conflicting with specimen plant locations to clear the root ball by twenty-four (24) inches minimum at no additional cost to the City. Watering of all specimen trees planted before completion of the irrigation system shall be the Contractor’s responsibility.

4. Contractor shall make all required water and utility connections as shown on the Contract Drawings or as required by the utility company. Replace all sidewalks, curbs or paving removed or damaged by the installation of required utilities to the satisfaction of the BCA Inspector.

B. Trench Excavating and Backfilling: Size trenches and other excavations to accommodate the irrigation system components, conduits, pipe bedding material and other required elements indicated on Contract Drawings. Provide a minimum of 6” of side clearance on outside of the piping or conduit to assure proper installation and access for inspections.

1. See TREE PROTECTION REQUIREMENTS in the Landscape Planting Specifications for all trenching within the protected root zone of an existing tree.

2. Unless otherwise specified, the minimum depth of cover over pipelines and conduits shall be as follows:

   a. Control wire conduit - 30-inches (36-inches under roadways and parking lots).

   b. Other Control Wiring - Depth of mainline, or a minimum of 24-inches cover if without any mainline.

c. Irrigation Mainline: 24-inches for piping 3” and smaller; 30-inches for piping 4” and larger.

d. Lateral lines - 12-inches.

3. Make the bottom of trenches true to grade and free of protruding stones, roots or other matter which would prevent proper bedding of pipe or other facilities.

4. All trench backfill shall be performed in accordance with approved soils report. Pipe bedding shall be clean site soil, free of all rocks, debris, etc. over 1/2" diameter. Bed pipe in at least 4-inches of finely divided material to provide a firm, uniform bearing. Surround the pipe with additional finely divided material to at least 6-inches over the top of the pipe. Bedding shall be placed in 6-inch maximum lifts. Backfill shall be site soil placed above the bedding to finish grade. There shall be no rocks over 2" in greatest dimension or organic matter in the backfill. All bedding and backfill shall be properly moisture conditioned and compacted at each lift. All trenches shall have a minimum relative compaction of 90%. Compaction shall be tested by the City at locations to be determined by the Geotechnical Engineer.

5. Finished trenches shall be flush with adjacent finish grades. The Contractor shall be responsible for maintaining the trenches flush and smooth with adjacent surface grade until final acceptance of the project. After compaction has been approved, trenches in existing turf areas shall be re-planted per "Method A" lawn repair of the Landscape Planting Specifications, unless otherwise noted.

C. Irrigation Pipeline Installation - General: Execute trench excavating and backfilling, including the depth of cover over the pipeline, in accordance with requirements above.

1. Pipe layout as shown on irrigation plan is diagrammatic. Contractor shall route piping in planted areas in the most expedient manner consistent with the requirements set forth herein, including avoidance of tree roots.

2. When two or more pipelines are installed in the same trench, separate the pipelines by a minimum horizontal clear distance of 12-inches. Install piping such that each pipe, valve, or other component may be serviced or replaced without disturbing the others.

2. During installation of pipe, fittings, valves, and other components, prevent soil or foreign matter from entering the system. Temporarily cap or plug all open ends at completion of installation operations.

3. All changes in pipe size shall be made with reducer fittings. No close nipples or bushings shall be used.

4. Where irrigation piping crosses a vehicular roadway or other paving, sleeve all pipe and conduit inside a Schedule 40 PVC sleeve of a minimum of two pipe sizes larger than the piping to pass through it under the paving at the depth of the mainline or 30 inches minimum. All sleeves shall extend a minimum of 3 feet beyond the edges of paving.

5. Pipe or irrigation components of dissimilar metals shall be separated by an approved "Dielectric" coupling.

D. Steel Pipe:

1. Square cut and ream pipe ends to full size with a long taper reamer.

2. Cut threads with clean sharp dies.

3. Make joints with a non-toxic, non-hardening joint compound applied to the male threads only.

4. Wrap steel pipe embedded in the ground with seamless 10 mil F.D.S. Safe-T-clad tape. Spiral wrap pipe with uniform laps. Apply the second layer of wrap in the reverse direction of the first layer of wrap.

5. Joints and any remaining unwrapped portion of the pipeline shall be similarly wrapped after pressure testing.

E. Solvent Welded Plastic Pipeline:

1. Join plastic pipe with slip type solvent welded fittings, threaded fittings as specified. Install steel pipe first when plastic pipe is joined to steel pipe.

2. Cut pipe square, externally chamfer approximately 10-15 degrees, and remove all burrs and fins.

3. Prior to the application of the P.V.C. solvent cement, prepare all surfaces to be solvent welded with tetrahydrofuran primer tinted purple. Make solvent welded joints in accordance with ASTM D2855 - PRACTICE FOR MAKING - SOLVENT - CEMENTED JOINTS WITH POLY (VINYL CHLORIDE) (PVC) PIPE AND FITTINGS. Use a solvent approved by the pipe manufacturer.

4. Install plastic pipe in accordance with ASTM D2774 - PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING and the requirements herein. Exercise care in assembling a pipeline with solvent welded joints so that stress on previously made joints is avoided. Handling of the pipe following jointing, such as lowering the assembled pipeline into the trench, shall not occur prior to the set times specified by the manufacturer.

5. Apply solvent to pipe ends in such a manner that no material is deposited on the interior surface of the pipe or extruded into the interior of the pipe during jointing. Wipe off excess cement on the exterior of the joint immediately after assembly.

6. Make threaded pipe joints using Teflon tape or other approved jointing material. Do not use solvent with threaded joints. Protect pipe from tool damage during assembly. Use vises with padded jaws and strap wrenches for installation of fittings and nipples. Remove and replace any plastic pipe which has been nicked, scarred, or otherwise damaged.

7. Snake plastic pipe from side to side in the trench to allow 1-foot of expansion and contraction per 100 feet of straight run.

8. Do not expose the pipeline to water for 24 hours after the last solvent welded joint is made.

F. Bell and Spigot Gasketed Pipeline:

1. Join plastic pipe with “push-on” type gasketed fittings with mechanical restraints as

detailed and specified.

2. Cut pipe square, externally chamfer approximately 10-15 degrees, and remove all burrs and fins. Remove and replace any plastic pipe which has been nicked, scarred, or otherwise damaged.

3. Align pipe sections straight. Clean all debris from the bell areas of the fitting and install gasket so that it is completely seated in the groove with no raised areas.

4. Apply lubricant to the installed gasket and to beveled end of the cut pipe or to the spigot end of the pipe or fitting. Align the pipe with fitting and push together by hand or with pry bars on the end of the fitting or with two pry bars using the lugs on the fitting. Insert until the reference line mark is even with edge of the fitting bell.

5. Install mechanical restraints per details and manufacturer's instructions.

6. Snake plastic pipe from side to side in the trench to allow 1-foot of expansion and contraction per 1000 feet of straight run.

G. Installation of Valves, Valve Boxes, and Special Equipment:

1. General: Install all valves and other equipment in strict accordance with the details, and make readily accessible for manual operation, maintenance or replacement.

2. Install isolation or gate valves of the same size as the pipeline in which they are installed, unless otherwise indicated.

3. Install all valves below ground housed in a covered valve box with a securable lid that will permit access for field servicing. Boxes shall be set flush with existing grade, including sloped areas, and all soil within 12 inches of the perimeter of the box shall be compacted per the trench repair section of this specification. Boxes are to be positioned per details.

4. Set valve boxes per applicable details and set valves at sufficient depth to provide clearance between the cover and valve handle or key when the valve is in the fully open position. Do not cover valve with pea gravel.

5. Install backflow preventers per applicable details with pipe supports and the accessories necessary to properly secure the assembly where required. Install backflow preventers per prevailing codes. All Backflow devices shall be certified by a licensed inspector as required by the County Health Department Test Instructions, Water Pollution Control Section after installation at the Contractor's expense.

6. No equipment shall be installed closer than 12 inches to any paved surface, unless separated from the paved surface by a wall, fence, curb, or similar barrier, or installed underground.

H. Irrigation Head Installation and Adjustment:

1. General: In accordance with the requirements of Subsection 3.2 of this Section, flush and pressure test all mains and flush lateral lines before installing irrigation heads.

2. Irrigation Head Placement and Spacing:

a. Irrigation plans are designed, as a minimum standard, for head-to-head coverage on

all spray heads. Head locations shall be determined by referencing the irrigation plan and using the head spacing listed in the irrigation head legend. Accuracy of final installation shall be within plus or minus 12 inches for all rotary heads having a throw of 30 feet or greater; within plus or minus 4 inches for all head types with a throw of under 30 feet. Do not exceed the maximum irrigation head spacing shown on the Contract Drawings.

b. Prior to head installation, Contractor shall mark the proposed locations of all irrigation heads in the field for review and approval by the Engineer. Contractor shall make any adjustments to head locations requested by the Engineer at that time at no additional expense to the City. Contractor shall provide minimum 48-hour notice prior to the requested time of inspection.

3. Head Installation:

a. Do not exceed the maximum irrigation head spacing shown on the Contract Drawings.

b. Install all irrigation heads 3-inches clear of adjacent walks, curbs, paving, headers, and similar improvements. Adjust all heads to flush with the final finish grade - adjusting for depth of sod in turf areas if needed.

c. All soil within 12 inches of the perimeter of the head shall be compacted as indicated in applicable details.

d. All irrigation heads shall be installed on swing joint assemblies as shown on details.

4. Irrigation Head Adjustment:

a. When all irrigation heads are installed and the irrigation system is operating, adjust and balance each section or unit with all section control valves fully open to obtain uniform 100% head to head coverage.

b. Adjust irrigation heads having adjustable pin nozzles, screws or orifices to provide optimum distribution of water over the coverage pattern. Without additional cost to the City, Contractor shall substitute larger or smaller nozzles in irrigation heads and/or add or omit sprinkler heads as necessary to obtain uniform coverage to meet MWELO requirements. Any requested modification shall not alter the total GPM to a degree to require a major revision of pipe sizing.

c. At no time is the irrigation system to cause excessive overspray on adjacent paved areas or cause any erosion to the site.

d. Low Head Drainage: The Contractor shall install in-line drainage swing check valves where necessary to prevent low head drainage or as indicated on contract drawings.

H. Automatic Control System Installation:

1. General: Install a complete automatic irrigation 2-wire control system, including the automatic controller, automatic control valves, decoders and wiring, and all necessary accessories and utility service connections.

2. Install the automatic controller outside of the coverage pattern of the irrigation system at the location designated on the Contract Drawings. Verify location with City Engineer prior to installation.

3. Install a separate disconnect switch between the source of power and the controller inside the controller enclosure per details. Provide grounding per details and manufacturer's instructions.

4. Install all electrical service wiring per Electrical Code in galvanized steel electrical conduit from the service point to the controller. The minimum service wire shall be No. 12 AWG copper 600 volt, Type THW or THWN or larger, as required by the controller manufacturer. Locate splices only in specified pull boxes and make splices with a water-proof packaged kit approved for underground use. Set pull boxes to finish grade on a 12-inch deep layer of one (1) inch crushed rock.

5. All 2-wire control wire shall be installed in 1-1/4" SCH 80 PVC conduit per details, with a maximum run of 200' between pull boxes. Install conduit in the same trench as irrigation mainline per trenching detail where possible. Low voltage control wire conductors between the 2-wire decoders and the valves shall be installed in 1/2" SCH 80 PVC conduit per details.

6. Wire connectors shall be DBY or DBR as manufactured by 3M Corp. Control wires shall be stripped of 1/2 inch of insulation USING A WIRE-STRIPPING TOOL SPECIFICALLY MADE FOR THAT PURPOSE, inserted into the electrical spring connector, and the connector twisted in a clockwise direction until the wires are tight. Insert the completed splice into the gel-filled tube, and check visually to confirm that the wire nut has been pushed past the fingers and is seated in the bottom of the tube. Position wires in wire channels and close insulator cover. Make splices in control wire in accordance with the requirements for service wire. Leave at least 2-feet of coiled slack at each splice and point of connection inside of valve boxes.

7. Testing Electrical Components: Field tests shall be performed by the Contractor on all irrigation system conductors in accordance with the requirements specified herein prior to performing the functional tests. Where conductors are installed by trenching and backfilling, such tests shall be performed after at least six (6) inches of backfill material has been placed over the conductors and backfill material has been compacted.

    a. Prior to the start of the functional testing, the Contractor shall perform the following tests on all irrigation system electrical conductors in the presence of the BCA Inspector.

    b. Each circuit shall be tested for continuity and open circuits.

    c. Each circuit shall be tested for grounds.

    d. An insulation resistance test at 500-volts DC shall be made on each circuit between the circuit and the ground. The insulation resistance shall not be less than 10-megohms on all circuits.

    e. The functional test for all the electric automatic irrigation system(s) shall consists of a minimum of fifteen (15) working days of operation during which time the controller shall complete at least three (3) complete cycles automatically for each station. The lengths and frequencies of the cycles will be determined by the City's representative. If unsatisfactory performance of the system develops, the condition shall be corrected

and the test repeated until fifteen (15) working days of continuous, satisfactory operation is obtained.

f. The functional test shall be satisfactorily completed prior to the start of the plant establishment period.

g. Repair to the irrigation system wiring shall be made within five (5) working days of a malfunction or damage to any portion of the system.

8. Contractor shall leave the control system in operating condition with an operational chart mounted within the controller cabinet upon completion of the work.

3.3 FLUSHING AND TESTING

A. After completion, and prior to the installation of any terminal fittings, thoroughly flush the entire pipeline system to remove dirt, scale, or other material. After flushing, conduct the following tests in the sequence listed below. Provide all equipment, materials, and labor necessary to perform the tests. Conduct all tests in the presence of the City Inspector.

1. The irrigation system mainlines shall be pressure tested for 24 hours at 125 p.s.i. with all control valves in place and closed. During the test, the Contractor shall provide pressure gauges downstream from the backflow device and upstream from the farthest remote control valve in the system. Air pressure testing of the irrigation system is acceptable if approved by the BCA inspector. Placement of control wires shall be verified before mainline trenches are backfilled after pressure test.

2. After installation, the irrigation lateral lines shall be thoroughly flushed in the presence of the BCA inspector. Each valve and lateral system shall be flushed commencing with the head closest to the valve and proceeding to the farthest head.

3. Irrigation Coverage Test: After installation of heads and lateral lines etc., entire irrigation system shall be tested for coverage. The BCA Inspector, Project Manager, Contractor and Recreation and Parks Regional maintenance staff shall be notified three (3) days before the scheduled test. Perform the coverage test for each zone after irrigation heads have been installed and demonstrated that each section or unit in the irrigation system is balanced to provide uniform and adequate coverage of the areas serviced. Correct deficiencies in the system in accordance with the requirements of Subsection 3.2(G)4.

4. Operational Test: Evaluate the performance of all components of the automatic control system for manual and automatic operation. During the maintenance period, and at least 15 days prior to final inspection, set the controller on automatic operation so that the system will operate satisfactorily during such period. Make all necessary repairs, replacements, and adjustments until all equipment, electrical work, controls, and instrumentation are functioning in accordance with the Contract Documents.

3.4 OPERATING MANUALS AND EQUIPMENT

A. Furnish the City with 2 bound copies of operating and maintenance manuals for all irrigation system equipment such as automatic controller, valves, heads, etc.

B. Explain in detail all irrigation equipment operations, watering schedule and maintenance procedures to the City personnel as directed by the Project Manager before completion of the

project.

C. Provide the City with a reduced legible copy of the "As-Installed" Irrigation Plan hermetically sealed in a plastic cover to be affixed inside the controller cover.

3.5 RECORD DRAWINGS

Irrigation record drawings shall include the following: Dimension the following locations from two permanent points of reference (building corners, sidewalks, road intersections, etc.):

1. Connection to existing water lines
2. Connection to existing electrical power
3. Gate valves
4. Mainline routing and/or directional turns (dimension maximum 100 feet along routing).
5. Remote control valves
6. Air and pressure relief valves
7. Master valves/flow sensors
8. Control wire routing
9. Quick coupling valves
10. Lightning protection (rod, plate, etc.)
11. Pull boxes
12. Irrigation controllers
13. Backflow prevention units

END OF SECTION

SECTION 32 91 10 - PLANTING SOIL PREPARATION AND SOIL MIXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents, including notes located on drawings, general and supplementary conditions and Division 1 general requirements, apply to the work of this Section and are hereby made a part of this Section.

B. Examine all Drawings and other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for manufactured planting soils including, but not limited, to the following:

1. Planting soil material acquisition.
2. Testing and analysis for specification conformance
3. Removal and replacement of unacceptable soils and substances
4. Preparation of soil mixes and testing for conformance.
    a. Type 1: Amended Native Soils
    b. Type 2: Imported Soils for on grade planting

B. Related Work Under Other Sections:

Section 32 84 00 Landscape Irrigation.
Section Demolition

1.3 QUALITY ASSURANCE / DEFINITIONS

A. Definitions:
1. ASA: American Society of Agronomy.
2. SSSA: Soil Science Society of America
3. ASTM: American Society for Testing and Materials
4. USDA: United States Department of Agriculture
5. UC: University of California

B. Contractor shall submit written documentation verifying at least five years of contracting and landscape construction experience completing projects of similar scope, complexity, and value.

C. Agronomic Soil Testing Agency shall be Wallace Laboratories, 365 Coral Circle, El Segundo, CA 90245 310/615-0116 or equal.

D. ASTM testing agency shall be Smith-Emery GeoServices, 791 East Washington Blvd., Los Angeles, CA 90021, phone 213/749-3411 or other equal

1.4 TESTING, SUBMITTALS AND MOCK-UPS

A. General: Refer to and comply with Division 1, SUBMITTAL PROCEDURES for procedures and other submittal criteria.

B. Notices and Scheduling: Submit a schedule itemizing time and volume of soils to be placed.

C. Certificates: Provide certificates required by authorities having jurisdiction, especially for any composted materials. Contractor shall submit certification of compliance that all soil blend components and all soil blends meet all environmental standards of the State of California as well as the agronomic specifications.

D. Soil Component Samples + Product Data: Prior to ordering the below listed materials, submit representative samples, history of source site, and manufacturers literature to the Architect, per Division 1 and to the Soil testing laboratory for review, testing and approval. Samples shall be labeled to indicate location of source, date of sample, and project name. Do not order materials until Architect's approval has been obtained. Delivered materials shall match the characteristics approved by the soil testing laboratory.

1. Imported Topsoil: sufficient number of 1 quart samples to fully characterize the source material.
2. Gravel / Rock: sufficient number of 1 quart samples to fully characterize the source material.
3. Organic amendment: 1 quart to fully characterize the source material.
4. Gypsum and fertilizers: provide manufacturer's cut sheets.
5. Soil mixes: after approval of individual components: sufficient number of 1 quart samples to fully characterize the material.

E. Soil Mixes: At least 30 days prior to ordering materials submit information identifying sources for all soil components and the firm responsible for mixing of soil mixes.

1. Architect shall have the right to reject any soil supplier.
2. Soil mix supplier shall have a minimum of 5 years experience at supplying custom over structure planting soil mixes.
3. Submit supplier name, address, telephone and fax numbers and contact name.

F. Testing for Base Soils and Soil Mixes: Testing is required at the following intervals:

1. Testing of individual components for all soil and subsoil mixes.
2. After test results for components have been accepted, create sample mixes of each planting soil and subsoil mix and perform tests.
3. After the test results for planting soil mixes have been accepted, and during the placement of planting soils and subsoil, test every 200 cubic yards of soil mix delivered to the job site. Testing applies to all soil layers of the planting profile.
4. In-place tests: Compaction tests of planting soil and subsoil layers.

G. Test Reports: Submit certified reports for tests as described in this Section.

1. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System. Percent clay (<0.002 mm) shall be reported separately in addition to silt, sand and gravel (SSSA/ASA, Methods of Soil Analysis, Part 4, Physcial Methods, 1986, chapter 15, pgs 383-411, hydrometer method).

2. The silt and clay content shall be determined by a Hydrometer Test of soil passing a 2 millimeter screen.

3. Submit a chemical analysis performed in accord with current ASA and UC Standards, including the following:

a. pH.

b. Percent organic matter as determined by total organic carbon, and total nitrogen. Test samples shall be oven dried to a constant weight at a temperature of 105° C.

c. Analysis for nutrient levels and toxic elements by parts per million including nitrate nitrogen, and extractable phosphorus, potassium, magnesium, manganese, iron, zinc, copper, boron, sulfate, calcium, molybdenum, sodium, aluminum, arsenic, cadmium, chromium, cobalt, lead, lithium, mercury, nickel, selenium, silver, strontium, tin, and vanadium. Nutrient tests shall include testing laboratory recommendations for supplemental additions to soils as calculated by amount of material to be added per volume of soils for type of plants to be grown in the soil.

d. Soluble salt by electrical conductivity of a saturated paste extract measured in Millimho per cm, soluble calcium, magnesium, potassium, sodium, sulfate, chloride, nitrate, and boron

4. Certified reports on analyses from producers of composted organic materials are required, particularly when sources are changed and when new stockpiles are used.

H. Inspections

1. The Contractor shall not place planting soils prior to inspection and approval of Architect for compliance with depth, grading and compaction specifications. The Contractor shall request inspection before proceeding.

I. All testing fees shall be paid by the contractor. Reports shall be issued to the Architect and contractor simultaneously.

1.5 DELIVERY, STORAGE AND HANDLING

A. The following provision is established: Material shall not be handled or hauled, placed or compacted when it is wet as after a heavy rainfall, muddy, or excessively dry. Soil shall be handled only when the moisture content is less than at field capacity, is friable and is workable.

B. Store and handle packaged materials in strict compliance with manufacturer’s instructions and recommendations. Protect all materials from weather, damage, contamination, adulteration, injury and theft.

C. Sequence deliveries to avoid delay. On-site storage space is permissible only with written notice from Construction Manager. Deliver materials only after preparations for placement of planting soil have been completed.

D. Prohibit vehicular and pedestrian traffic on or around stockpiled planting soil.

E. Protect soils and mixtures from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If excess water is introduced into the material after grading, allow material to drain to near optimum compaction moisture content before working.

F. Soil that is to be stockpiled longer than two weeks, whether on or off site, shall not be placed in mounds greater than six feet high. If soil stockpiles greater than six feet high are present longer than two weeks then the contractor shall break down, disperse soil and screen soil though a 0.5 inch screen so that mounds do not exceed the six foot height restriction for longer than two weeks.

G. Vehicular access to the site is restricted. Before construction, the Contractor shall submit for approval a plan showing proposed routing for deliveries and site access.

H. Field Moisture Test of friable soil
1. Make a soil cast in the palm of hand, if soil retains the compressed shape but crumbles upon compression, the soil may be worked.
2. If the soil will not retain shape it is too dry and should not be worked.
3. If the soil retains shape and will not crumble, it is too wet and should not be worked.
4. If the soil glistens or free water is observed when the sample is patted in the palm of hand the soil is too wet and should not be worked.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS + AMENDMENTS

A. Suppliers
1. Sand:
a. PW Gillibrand; 805-526-2195/ 800-760-4083; 4537 Ish Drive, Simi Valley, CA 93062; http://www.pwgillibrand.com/ or equal
b. Carmeuse Industrial Sands; 800/345-0171; 31302 Ortega Highway, San Juan Capistrano, CA 92675 or equal
2. Peat:
a. Peat Inc. – 800-441-1880; http://www.peatinc.com/ or equal
b. Dakota Peat – 800-477-8415; http://www.dakotapeat.com/ or equal

B. General: All planting mix materials shall fulfill the requirements as specified and be tested to confirm the specified characteristics.
1. Samples of individual components of soil mixes in addition to blended soil mixes including mulch materials shall be submitted by the Contractor for testing and analysis to the approved testing laboratory. Comply with specific materials requirements specified.
a. No base component material or soil components for soil mixes shall be used until

certified test reports by an approved agricultural chemist have been received and approved by the Architect and soil laboratory.

b. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.

2. The Architect may request additional testing by Contractor for confirmation of mix quality and/or soil mix amendments at any time until completion.

C. Base Sandy Loam

1. Base Sandy Loam as required for blending with other components shall be stripped on-site topsoil where it is suitable, soil from approved Topsoil Stockpile, and / or purchased approved topsoil from off site. Topsoil shall be stripped carefully and shall be free of subsoil or extraneous matter. Stripped topsoil which is contaminated with subsoil or otherwise compromised shall be replaced with equivalent topsoil from off-site at no additional expense. Stripped topsoil shall be stockpiled in designated areas and shall be maintained in a modestly damp condition in piles not greater than six feet high. Soil moisture shall be high enough to avoid excessive dust emission and not too moist to cause anaerobiosis.

2. Soil shall be sandy loam according to the USDA classification scheme. Gravel over 2 millimeters in diameter shall be less than 20% by weight. Sand shall be 20% - 85%, Silt 0% to 50% and Clay 0% to 20%. Soil shall be free of rock or gravel larger than 1 inch in any dimension, pockets of coarse sand, roots, clods, debris, waste, frozen materials, noxious weeds, sticks, lumber, brush, vegetation, and other deleterious matter. It shall not be infested with nematodes or other undesirable disease-causing organisms such as insects and plant pathogens.

a. Permeability Rate: Hydraulic conductivity rate shall be not less than one inch per hour nor more than 20 inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.

b. Fertility: The range of the essential elemental concentration in soil shall be as follows. Soil might need to be fertilized for optimum fertility:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
phosphorus	10 – 40
potassium	100 - 220
iron	5 - 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

c. Acidity - The soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.9

d. Salinity - The salinity range measured in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 0.5 - 2.5 dS/m.

e. Chloride - The maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/l (parts per million).

f. Boron - The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/l (parts per million).

g. Sodium Adsorption Ratio (SAR) - The maximum SAR shall be 3 measured per Method 20b, USDA Handbook Number 60.

h. Aluminum – Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than 3 parts per million.

i. Soil Organic Matter Content - Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. The desirable range is 3% to 6%. The carbon: nitrogen ratio should be about 10. A high carbon: nitrogen ratio can indicate the presence of hydrocarbons or non- humified organic matter.

j. Calcium Carbonate Content - Free calcium carbonate (limestone) shall not be present for acid-loving plants.

k. Heavy Metals - The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

Ammonium Bicarbonate/DTPA Extraction
parts per million (mg/kilogram) dry weight basis

arsenic	1
cadmium	1
chromium	10
cobalt	2
lead	30
mercury	1
nickel	5
selenium	3
silver	0.5
vanadium	3

l. If the soil pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.

m. Phytotoxic constituent, herbicides, hydrocarbons etc. - Germination and growth of monocots and dicots shall not be restricted more than 10% compared to the reference soil. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

3. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition. pH shall be less than 8.0. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.

D. Organic Soil Amendment

1. Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%. Organic matter shall be at least 50% on a dry weight basis.
2. The pH of the material shall be between 6 and 7.5.
3. The salt content shall be less than 10 millimho/cm @ 25° C. (ECe less than 10) on a saturated paste extract.
4. Boron content of the saturated extract shall be less than 1.0 parts per million.
5. Silicon content (acid-insoluble ash) shall be less than 50%.
6. Calcium carbonate shall not be present if to be applied on alkaline soils.
7. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.
8. Composted wood products are conditionally acceptable [stable humus must be present]. Wood based products are not acceptable which are based on red wood or cedar.
9. Sludge-based materials are not acceptable.
10. Carbon: nitrogen ratio is less than 25:1 and less than 20:1 when used in sand soil blends.
11. The compost shall be aerobic without malodorous presence of decomposition products.
12. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen.

Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis:

arsenic	20	copper	150	selenium	30
cadmium	15	lead	100	silver	10
chromium	100	mercury	10	vanadium	200
cobalt	50	molybdenum	20	zinc	200
		nickel	100		

E. Uniformly Graded Coarse Sand

1. Sand for Planting Soil blends, for in-place Soil Amendment and for Drainage Layers shall be uniformly graded coarse sand consisting of clean, inert, rounded to sub-angular grains of quartz or other durable rock free from loam or clay, mica, surface coatings and deleterious materials with the following gradation.

	Percent Passing	
U.S. Sieve Size Number	Minimum	Maximum
10	100	--
18	60	85
35	25	50
60	8	24
140	0	8
270	0	3
0.002mm (by hydrometer)	0	0.5

(A blend of number 20 and number 30 sands.)

2. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition. pH shall be less than 8.0. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.

F. Uniformly Graded Medium Sand

1. Sand for Lightweight Soil blend shall be uniformly graded medium sand consisting of clean, inert, rounded to sub-angular grains of quartz or other durable rock free from loam or clay, mica, surface coatings and deleterious materials with the following gradation.

	Percent Passing	
U.S. Sieve Size Number	Minimum	Maximum
4	100	--
10	98	100
18	68	82
35	0	20
60	1	1

(A number 16 sand.)

2. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition. pH shall be less than 8.0. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.

G. Gravel / Rock: Gravel/rock shall be triangular without limestone or sandstone. Gravel shall pass a 3-inch screen and be retained on a 2-inch screen. Acceptable aggregate dimensions will not exceed 1.5:1.0 for any two dimensions chosen.

H. Peat: Partially decomposed hemic / sapric peat moss, finely divided or granular texture with a pH range of 4.0 to 6.5. ECe less than 3 millimho/cm, carbon:nitrogen ratio less than 25, minus 10 mesh, minimum cation exchange capacity is 50 millimoles per 100 grams, minimum 60% organic matter.

I. Ureaformaldehyde (38-0-0): Minimum 38% nitrogen derived from methylene urea, minimum 24% cold water insoluble nitrogen, minimum 40% activity index.

J. Potassium sulfate (0-0-50): Granular, and containing a minimum of 18 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

K. Triple superphosphate (0-45-0): Commercial, phosphate mixture, soluble; a minimum of 45 percent available phosphoric acid.

L. Agricultural Gypsum: Agricultural mineral containing a minimum of 92% calcium sulfate dihydrate. Minimum gradation: 100% passing 10 mesh sieve; 98% passing 20 mesh sieve; 60% passing 60 mesh sieve, and 40% passing 100 mesh sieve.

M. Ground Agricultural Limestone (calcium carbonate): Minimum 95% calcium carbonate, 100% passing a number 20 screen, at least 85% passing a number 60 screen.

N. Ammonium sulfate (21-0-0): Commercial-grade fertilizer of neutral character, consisting of 21% Nitrogen and 24% combined Sulfur.

O. Calcium ammonium nitrate (27-0-0): Commercial-grade fertilizer containing 13.5% ammoniacal nitrogen, 13.5% nitrate nitrogen, 4% calcium and 1% magnesium.

P. PAM: A linear, water-soluble, propenoate-propenamide copolymer Soil Drain/PAM as manufactured by Complete Green Company. Tel: (310) 640-6815 or equal.

2.2 SOIL MIXES –

A. Uniformly mix properly measured ingredients by rotary blending, windrowing/tilling, on an approved hard surface area and/or screening to achieve a homogenous blend. Organic Amendment shall be maintained moist, not wet, during mixing. Amendments shall not be added unless approved to extent and quantity by the owner and additional tests have been conducted to verify type and quantity of amendment is acceptable. Percentages of components, unless otherwise noted, will be established upon completion of individual test results for components of the various mixes. After component percentages are determined by the Soil Scientist, each

B. Imported Blended Topsoil

1. Blended Topsoil shall consist of a combination of approximately equal parts Base Sandy Loam, and Organic Amendment.

2. Maximum size shall be one half-inch largest dimension. The maximum retained on the #10 sieve shall be 15% by weight of the total sample. The ratio of the particle size for 80% passing (D_{80}) to the particle size for 30% passing (D_{30}) shall be 8 or less. (D_{80}/D_{30} <8) The final mix shall have an organic content between 4 and 6 percent by weight.

3. Fertility per 2.1 D 2b.

4. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH. Fertility per Part 2, 2.1, B The pH shall be between 6.5 and 7.5.

PART 3 - EXECUTION

3.1 MIX DESIGN

A. Prepare sample soils mixes to determine final exact ratio of mix components. Submit to Architect for approval.

1. Submit samples and test results of each mix component for approval.

2. Prepare samples of proposed mix ratio options and obtain soils test as specified

herein. Submit samples of each mix with test results.

3. Architect may request additional soils mix ratio samples to be tested in event that further refinement of mix is necessary.

4. Submit to Architect proposed fertility amendment recommendations including amounts and types of fertilizers and pH adjustments for each mix ratio based on soils report and recommendations of soil testing laboratory. Fertility adjustments shall be included as part of mixing process of soils.

3.2 PRE-INSTALLATION EXAMINATION AND PREPARATION

A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

B. Pre-Installation Examination Required: The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and shall notify the Architect in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means Contractor accepts substrates, previous work, and conditions. The Contractor shall not place any planting soil until all work in adjacent areas is complete and approved by the Architect.

C. Examination of Subgrade: The subgrade shall be examined by the Contractor prior to the start of soil placement and planting. Any deficiencies shall be noted and related to the Architect in writing prior to acceptance of the subgrade by the Contractor. Deficiencies include, but shall not be limited to the following:
1. Construction debris present within the planting areas. Absolutely no debris is acceptable in over structure garden roof areas.
2. The subgrade is at incorrect depths for installing the designed soil profile and drainage layer.
3. Incomplete irrigation and/or subsurface drainage installation.

D. Planting Area Preparation Over Natural Grade : Scarify and examine soil and remove foreign materials, stones and organic debris over 1/2” in size in the areas to receive planting. . In the event that there are toxic or harmful substances present including herbicides, fuels, oils, concrete washout silts, or other materials harmful to plants are present in areas of proposed planting or have been spilled into subgrade materials, excavate the soils sufficiently to remove the harmful materials. Fill over-excavation with approved clean fill to a depth of 4 feet below finished grade of tree wells and 2 feet below finished grade of shrub and ground cover areas, compact to required subgrade compaction and cover with import planting soils to finish grade elevations.

3.3 BLENDING PLANTING SOIL MIXES

A. Soil mixtures shall be produced with equipment that blends together each component in a thorough and uniform manner.

B. The Contractor is responsible for achieving approvals of base soils and soil mixes in a timely manner such that fully approved soil mixes are available in approved batches when needed and no delays are caused.

3.4 PLACEMENT OF PLANTING SOILS

A. General

1. Prevention of compacted soils can be accomplished by beginning the work in corner, against walls, or the center of isolated beds, and progressing outwards towards the borders.
2. Planting soils and Subsoil shall never be moved or worked when too wet or frozen.
3. The Contractor shall place barricades as required to prevent any unnecessary compaction of planting soil from vehicles, equipment, or pedestrian traffic. No wheeled vehicles shall travel over any planting soil unless equipped with low ground pressure tires.
4. Notify the Architect of soil placement operations at least seven calendar days prior to the beginning of work.

B. Imported: Blended Topsoil for Groundcovers and Shrubs

1. After subgrade levels have been reached and approved and subsurface drainage has been installed, place Topsoil and compact to about 70-75 percent Standard Proctor.
2. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
3. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 PRELEACHING

A. After soils have been placed, and prior to planting, preleach soils to reduce the alkalinity, salinity, magnesium, sodium and chloride. Reduce pH to less than 8.0. Reduce the salinity to less than 3 millimho/cm if over 3 millimho/cm. The salinity will increase with use of gypsum. Higher rates of gypsum 100 pounds per 1,000 square feet can be used if the soil will be preleached. Lower the SAR to less than 4.0 if over 4.0.

B. After the preparation of the soil, test the quality of the amended soil for suitability prior to seeding and planting. Add additional amendments as directed by Soil Scientist and Landscape Architect.

C. Apply maintenance fertilizers based on analytical data of test data. Apply gypsum if necessary based on the analytical data.

3.6 PROTECTION

A. Protect newly graded areas from traffic, freezing and erosion. Keep free of trash, debris or construction materials from other work.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace material to a depth as directed by the Architect; reshape and re-compact at optimum moisture content to the required density.

C. Where settling occurs, before final acceptance or during the warranty period, remove finish surfacing, backfill with additional approved material, compact to specified rates, and restore any disturbed areas to a condition acceptable to the Owner.

3.7 COORDINATION AND EXCESS MATERIALS

A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

B. Excess Planting Soil Mixtures and Materials: Remove the excess planting soil mixture and materials from the site at no additional cost to the Owner unless otherwise requested.

3.8 POST-INSTALLATION TESTING

A. In-place density testing is required in all areas. The standard test for surface and subsurface density shall be ASTM D-1556.

END OF SECTION

SECTION 32 93 00 - PLANTING

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 fine grading, landscape planting, landscape accessories labor, materials and equipment.

B. Related Sections include the following:
Irrigation
Planting Soil Preparation
Thermal and Moisture Protection

1.3 PERFORMANCE REQUIREMENTS

A. Provide landscape grading, plant procurement, and planting installation required to complete landscape planting and establishment maintenance for healthy plant growth.

1.4 SUBMITTALS

A. Test Reports Material Samples and Photographs:

1. Grass Seed: Each delivery of seed shall be accompanied by a certificate from supplier stating weight, composition of mixture, and percentage of germination of each seed variety.
2. Grass Sod: Product Materials, each delivery of sod shall be accompanied by a certificate from supplier stating weight, composition of mixture, and percentage of germination of each seed variety.
3. Fertilizer and amendments: Product descriptions and physical samples.
4. Pesticides: Submit manufacturers literature and application methods for each pesticide proposed for use.
5. Mulch: See specifications on drawings
6. Decomposed Granite: See specifications on drawings
7. Plant materials: See specifications on drawings

B. Certificates:

1. Submit a certificate with each delivery of bulk material, including import soil, stating source, quantity, and type of material, and that material conforms to Specification requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Contractor to have 10 years of similar experience and is licensed for the work required for this Project.

B. Plant Materials:
1. Plant materials shall be furnished in a thriving healthy condition in the quantities or spacing as shown or noted for each location, and shall be of the species, kinds, sizes and types, per symbol or as described on the Drawings. The Contractor shall also stake all tree planting locations at this time for review and approval by the Project Manager
2. Tree Tagging: See Planting section of Landscape Construction Notes. Contractor shall request tree tagging scheduling with the Architect, allowing 3 days advance notice.
3. Verification of Dimensions and Quantities: Before proceeding with work, Contractor shall carefully check and verify dimensions and quantities and shall immediately inform the Landscape Architect of any discrepancy between Drawings and Specification and actual conditions.
4. Protection: Carefully and continuously protect areas included in work, such as lawns, plant materials, fences and supports, until final acceptance of the work by the Owner.

C. Pest Management Method and Products:
1. Only pest management methods and products demonstrated to be safest and lowest risk to children will be used, those products that will not cause or those that will have the least health effects as cancer, neurological disruption, birth defects, genetic alteration, reproductive harm, immune system dysfunction, endocrine disruption and acute poisoning. Pest management methods and products used in the execution of this contract shall be in strict conformance with the State Integrated Pest Management policy including, but not limited to, the list of approved products.
2. Only pest management products on the approved list that can be applied in a manner and at a time where no person can inhale or come into direct contact with them, or be exposed to volatile agents shall be used.

1.6 WARRANTY

A. Replacement: Within 15 days after notification by the Architect, remove and replace plant materials that are in clear decline or have failed. Replacement materials shall be guaranteed as specified for original plant materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Soil Conditioners:

1. Fertilizers and Chemical amendments: As recommended by Soil Analysis Report and specifications on drawings.

B. Tree-Root Control Barrier: Shall be fabricated from a high density and high impact plastic such as polyvinyl chloride, ABS or polyethylene, and have a minimum thickness of 0.06 inch. The plastic shall have ½ inch to ¾ inch high raised vertical ribs on thinner surface spaced at least 6 inch but not more than 8 inch apart. Install a plastic root control barrier with each new tree planted. Barrier is available from Deep Root Corp http://www.deeproot.com/. See drawings for locations.

C. Pest Management Methods and Products

1. Pesticides (insecticides, herbicides, fungicides, rodenticides, avicides and growth regulators) shall not contain any ingredients (both active and inert) which are:

    a. Banned, suspended, cancelled, discontinued or withdrawn by United States Environmental Protection Agency or Department of Pesticide Regulation of California Environmental Protection Agency.
    b. Not registered for the intended use with above agencies.
    c. Known or suspected to be a carcinogen according to International Agency for Research on Cancer (IARC), United States Department of Health and Human Services - National Toxicology Program (USDHHD-NTP), United States Department of Labor-Occupational Health and Safety Administration (USDOL-OSHA), California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65).
    d. Known to be mutagenic, teratogenic, oncogenic, neurotoxic, or cause reproductive hazards in humans.
    e. Listed as Class I Pesticides (extremely toxic) or labeled as "Danger".
    f. Classified as Highly Toxic by USDOL-OSHA if mode of application is spraying or broadcast-spreading.

D. Plant Materials: Plant materials indicated on Drawings and specified shall conform to the following:

    1. TREES: All trees shall be stabilized as designated on the Contract Drawings. Once the trees are tagged they shall not be pruned at the nursery or by the contractor unless approved by the Architect. No trees without the tag of the Architect will be accepted at the site.

E. SOD: Sod shall be free of dead or diseased areas.

F. Mulch: Shredded bark mulch. Shall be seasoned tree chip mulch, free all foreign matter including weed and tree seeds.

PART 3 - EXECUTION

3.1 INSPECTIONS

A. See the inspections required in the Contract drawings, the following additional inspections by the Architect are required. Provide a minimum of 72 hours advance notice of inspections. The following inspections are in addition to those on the drawings.
    1. When waterproofing and protection systems, and drainage systems are installed prior to placement of planting media.
    2. Rough grading review
    3. Tree and Shrub sample locations for approval prior to excavation of planting pits. Sample planting pit sizes and depths.
    4. Tree rootball elevations, orientation in the planting pits, staking and sub surface anchoring
    5. Lawn or turf areas completed sodding
    6. Final inspection at the end of the establishment as final inspection.

3.2 GENERAL GRADING AND SOIL PREPARATION

A. Preliminary Grading:

    1. Tree Protection: hand grade around all existing tree roots. Do not change the finish grade in the area of existing trees.

2. Preliminary grading shall be done in such a manner as to anticipate finish grading. Import soil in areas over natural grade, where used, shall be dug into top 6 inches of the existing soil. Excess soil shall be removed or redistributed before application of soil amendments. Allowance shall be made so that when finish grading has begun there shall be no deficiency in specified depth of mulched planting beds.

3. Moisture Content: Soil shall not be worked when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily. Water shall be applied, if necessary, to provide ideal moisture content for tilling and for planting.

B. Finish Grading:

1. When preliminary grading, including weeding and amendments, has been completed and soil has dried sufficiently to be readily worked, lawn and planting areas shall be graded to elevations indicated on Drawings. Grades not otherwise indicated shall be uniform levels or slopes between points where elevations are given. Minor adjustments of finish grades, if required, shall be made at direction of the Architect. Finish grades shall be smooth, even, and uniform planes with no abrupt change of surface. Soil areas adjacent to buildings shall slope away from buildings to allow a natural runoff of water, and surface drainage shall be as indicated on Drawings.
2. Trenches: If sprinkler system is installed after grading and fertilizing is completed, upper portion of backfill shall be re-tilled and amended to required depth for particular area specified.

3. Prepared Soi ON GRADE AREASl: Soil backfill in pits for trees, shrubs, vines, and for planter boxes shall be a prepared soil consisting of native soil, organic amendments and fertilizers per the project soil reports. Prepared soil shall be mixed in areas adjacent to planting work, and shall be accurately proportioned, using a suitable measuring container such as a wheelbarrow of measured capacity.

3.3 METHOD OF PLANTING

A. No planting shall be done until operations in conjunction with installation of irrigation system have been completed, final grades have been approved, concrete and metal headers have been installed, planting areas have been prepared as specified, and work tested and approved

B. Relative position of trees and plants is subject to approval of the Landscape Architect, and they shall, if necessary, be repositioned as directed at no additional cost to the Owner.

C. Plants shall be set so that, when settled, they bear same relation to the required grade as they bore to natural grade before being transplanted. Each plant shall be planted in center of pit and backfilled with prepared soil. No soil in muddy condition shall be used for backfilling. No filling will be permitted around trunks or stems. Broken or frayed roots shall be properly cut off

1. Shrubs, unless otherwise indicated, shall be placed a minimum of 18 inches from buildings, walls, and fences.

2. Planting of Trees: The bottom of the planting pit shall be well compacted stable soil or a stable support resting on the roof assembly protection material. Pits for trees shall be dug square with bottom level, length of sides equal to 2 times diameter of ball of tree or the equivalent volume. Compacted soil at sides shall be loosened by scarifying or other approved method. Pits shall be back-filled with compacted, prepared soil to bottom of the tree ball, tree set to required grade, balance of pit filled with prepared soil, and thoroughly settled by tamping and watering.

3. Planting of Shrubs and Vines: Shrubs and vines shall be planted in pits two times the diameter of the plant container. Compacted soil on the sides of pit shall be loosened and pit filled with prepared soil to bottom of ball. When plant has been properly set, pit shall be filled to the required grade with prepared soil, thoroughly settled by tamping and watering. Vines shall be removed from stakes, untied, and securely fastened in an approved manner to wall, fence, or other surface adjacent to which they are planted.

4. Planting of Groundcover: Ground cover plants shall be evenly spaced to produce uniform coverage, and staggered in rows at intervals indicated on Drawings. Plants shall be mulched as specified and watered after planting operations are completed. Soil shall be kept continually moist by watering as often as required. Mulching and first watering shall be done in conjunction with planting, but not later than same day the plants are planted. Backfill of prepared soil is not required.

D. LAWN OR TURF AREAS
1. See notes on drawings.

E. GROUNDCOVER INSTALLATION

1. Plant groundcover in areas so indicated on Drawings.

2. Plant rooted cuttings and divisions from flats in locations indicated on Drawings.

3. Smooth soil around plants in form of slight, saucer-like depression, and leave areas in neat and clean condition. Do not pile soil around crown of any plant.

4. Water groundcover plants individually with slow stream of water. Ensure that soil has settled around roots. Care shall be taken not to wash soil off roots.

F. TREE SUPPORTS
1. Install stakes per details and manufacturer’s instructions.

G. HEADERS

1. Edgings that act as dividers between lawn and groundcover, tree and shrub areas are termed "Landscape Headers" and shall be as specified on Drawings. They shall be of size and type indicated and detailed and in locations indicated on Drawings.

2. Excavation shall be carefully done to proper alignment and grade for particular header involved. Backfill shall be carefully placed and thoroughly tamped against header.

3. Metal headers, unless otherwise indicated, shall be flush with grade and held in place with stakes of lengths necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically and securely attached to headers. Stakes shall be spaced per manufacturer’s recommendations. Stakes holding curved headers shall be close enough together to firmly hold headers in alignment indicated on Drawings. Curved headers shall form their own tangent for at least 5 feet beyond point of tangency to ensure a smooth flowing curve. Unsightly breaks in alignment will not be accepted.

   a. Compact backfill, on both sides of headers, to density of undisturbed adjoining earth.

   b. Headers shall be in place before any adjacent portion of sprinkler system is installed.

H. TREE-ROOT CONTROL BARRIER

1. Tree root control barriers shall be provided in all cases where planting pits are adjacent to paving. Barriers shall be linear along the paving edge and shall not encircle all sides of the root ball.

2. Plastic barrier wall thickness shall be a minimum of 0.06 inches and each barrier shall have a locking device to hold barrier in position after installation.

3. Barrier size needed to enclose tree varies to meet individual tree size. Follow manufacturer's recommended guides.

I. MULCHING: All planting areas except lawn shall receive a minimum three (3) inch deep layer of Top Dressing Mulch per the Planting Details and the Landscape Construction Notes. Mulch shall be spread evenly throughout planting beds and tree watering basins. Keep mulch 6 inches from shrub root crowns and 1 foot from tree root crowns. Prior to placing mulch, apply pre-emergent herbicide per manufacturer's instructions.

3.4 PESTICIDE APPLICATION

A. Application rates and methods shall conform to written recommendations of manufacturer and shall comply with regulations of Los Angeles County Agricultural Commissioner and the Department of Agriculture, State of California.
1. Only well trained, competent operators shall be allowed to apply pesticides.
2. Pesticide application shall be performed in accordance with pertinent State and Federal laws and regulations. In addition, application shall be performed under following conditions, but not limited to:

1) Provide posted warning signs
2) Using low pressure spraying when permitted.
3) Spraying after use hours with no children present
4) Strict adherence to manufacturer's recommended reentry period after application.
5) Pesticides shall be used in strict conformance to manufacturer's instructions on product labeling.
6) Applicators shall use appropriate personal protective equipment recommended in accordance with product labeling.

3.5 ESTABLISHMENT PERIOD AND MAINTENANCE

A. During the installation and maintenance period, Contractor shall be responsible for maintaining adequate protection for planted areas.

B. At completion of maintenance period plant materials shall be live, healthy, undamaged and free of infestations.

C. Replacements: Contractor shall replace plant materials and grass that is dead or damaged. Replacements shall meet standards for original plantings.

D. Weed Control On Groundcover And Shrub Beds: Apply pre-emergent herbicide after planting. Herbicide shall be approved for use by the State and County and shall have minimal detrimental effect on groundcover plants. Rate and method of application shall conform to the written recommendations of manufacturer.

E. Lawn Areas - Turf Areas:

1. Upon observing any lawn spreading into shrubs or groundcover areas, Contractor shall initiate a program of mechanical removal and maintain this program throughout maintenance period

2. Lawn Weed Control: At first appearance of any broadleaf weed germinating in lawn areas, Contractor shall remove all weeds. If weeds persist or if damage resulting from this operation becomes objectionable, Contractor shall control weed growth with a selective weed killer with approval of the Owner, and maintain such control throughout the maintenance period.

3. Lawn Repair : Irrigation trenches shall be fully compacted and the grade brought flush with the adjacent undisturbed finish grade. Irrigation trench areas and areas where equipment has damaged the existing lawn shall be seeded per this section.

F. Fertilization: Broadcast commercial fertilization (16-10-4) over entire "Lawn Area" (Turf Area) at rate of 1 pound per 1000 square feet in 2 applications, 30 days apart. Follow soil analysis maintenance recommendations. Do not fertilize plants identified as ‘not to receive fertilizers’ on the drawings.

G. New Trees: Broadcast commercial fertilizer over entire watering basin per manufacturer’s recommendations and water immediately. Repeat approximately 30 to 45 days after start of maintenance or after tree has produced definite signs of establishing itself after transplant and is producing new growth, whichever is first.

H. Pruning Trees, Shrubs and Groundcover Areas:

1. Pruning shall be performed by a qualified pruner. Plants shall not be pruned to reduce head or growth. Only broken, damaged or crossing tree limbs shall be removed. Plants shall not be shaped or otherwise trimmed.
2. Pruning shears, saws, etc. shall be sterilized prior to pruning each tree by total immersion in a solution of mercuric chloride or formalin.
3. Cuts larger than 3/4 inch diameter shall be immediately sealed with a compound produced specifically for that purpose such as "Tree Seal".

I. Insect and Fungus Control: Contractor shall be alert for signs of insect presence or presence of damage from plant fungi. Treat fungus or insects with safe products according to the manufacturer’s directions to eliminate the pest.

3.6 CLEAN UP

A. Upon completion of planting operations and maintenance period, remove equipment and clean site of debris and superfluous materials.

END OF SECTION 32 93 00

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DIVISION 33
UTILITIES

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SECTION 33 40 00 - STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes storm drainage piping; sub-surface drains; metal covers, grates and frames; catch basins; box culverts; manholes, and BMPs.

1. Best Management Practices (BMPs):

a. Catch Basin Inserts.

2. Closed-circuit television inspection of storm drain lines.

1.2 RELATED REQUIREMENTS

A. Division 01 - General Requirements.
B. Section 31 2313 - Excavation and Fill.
C. Section 31 2323 - Excavation and Fill for Utilities.
D. Section 32 0117 - Pavement Repair.
E. Section 32 1313 - Site Concrete Work.

1.3 DEFINITIONS

A. AASHTO: American Association of State Highway and Transportation Officials.
B. ASME: American Society of Mechanical Engineers.
C. ASTM: American Society for Testing and Materials.
D. BMP: Stormwater Best Management Practice.
E. CBC: California Building Code.
F. CCTV: Closed-Circuit Television.
G. DET: Detention BMP.
H. DWV: Drain, Waste, and Vent.
I. FILT: Filter BMP.
J. GS: Gravity Separator.
K. HDPE: High Density Polyethylene.
L. IAPMO: International Association of Plumbing and Mechanical Officials.
M. IOR: Inspector of Record.
N. NPS: Nominal Pipe Size.
O. OAR: OWNER's Authorized Representative.
P. PE: Polyethylene.
Q. Post Construction BMP: Devices installed by the CONTRACTOR for storm water management to be left on site after construction completion.
R. PP: Polypropylene.
S. PVC: Poly Vinyl Chloride.
T. RET: Retention.
U. SDR: Standard Dimensions Ratio.
V. VEG: Vegetative.
W. OWNER: Los Angeles Unified School District.
X. SWPPP: Storm Water Pollution Prevention Plan.

1.4 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. ASHTO M 252: Geotextile Specification for Highway Applications.
2. AASHTO M 294: Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
3. AASHTO M 330: Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

B. American Society for Testing and Materials International (ASTM):

1. ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. ASTM C14: Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
3. ASTM C443: Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
4. ASTM C564: Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
5. ASTM C76: Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
6. ASTM C857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
7. ASTM C858: Standard Specification for Underground Precast Concrete Utility Structures.
8. ASTM C891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.
9. ASTM D2564: Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
10. ASTM D2665: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
11. ASTM D2855: Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
12. ASTM D3034: Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
13. ASTM D3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
14. ASTM D448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
15. ASTM F1866: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings.
16. ASTM F2306: Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
17. ASTM F2418: Standard Specification for Polypropylene Corrugated Wall Stormwater Collection Chambers.
18. ASTM F2764: Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.
19. ASTM F2787: Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers.
20. ASTM F2881: Standard Specification for 12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.

21. ASTM F2922: Standard Specification for Polyethylene Corrugated Wall Stormwater Collection Chambers.
22. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
23. ASTM F656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
24. ASTM F794: Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

C. Cast Iron Soil Pipe Institute (CISPI):

1. CISPI 301: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

D. The International Association of Plumbing and Mechanical Officials (IAPMO):

1. IAPMO IS 6: Hubless Cast Iron Sanitary and Rainwater Systems - Installation Standards.

E. Standard Specifications for Public Works Constructions (Greenbook):

1. Section 202: Masonry Materials.
2. Section 206: Miscellaneous Metal Items.
3. Section 207: Pipe.
4. Section 208: Pipe Joint Types and Materials.
5. Section 210: Paint and Protective Coatings.
6. Section 306: Underground Conduit Construction.

1.5 SUBMITTALS

A. Shop Drawings: Submit site plan denoting locations of lines, valves, and appurtenances.
B. Product Data: Manufacturer’s catalog data for all required materials. Include technical data for accessories, information concerning gaskets, joints and couplings.
C. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.
D. Closeout Documents: At Substantial Completion submit to the Owner’s Authorized Representative two CD’s and one hard copy of the documents indicated in paragraphs 1 through 5 below:

1. Maintenance Log: Provide Microsoft Excel Spreadsheet including the following information:
    a. Maintenance log and upkeep records of the installed Post Construction BMPs. Include the following headers as a minimum: “Date of Service”, “Location of BMP”, “Type of Maintenance or Service”, “Notes”, “Next Scheduled Preventive Maintenance Due”, and “Inspector Signature”.
    b. Maintenance Requirements: Include the following headers as a minimum: “BMP Description”, “Location of BMP and Map Grid Location” and “Type of Maintenance or Service Needed”, i.e.; weekly, monthly, quarterly, etcetera. “Stock No.”, “Manufacturer Contact Information”, along with “Frequency” namely: weekly, monthly, quarterly, etcetera and “Special Instructions”.

2. Maintenance Manuals: Provide Maintenance Manual for storm drainage BMP components installed along with requirements, replacement or maintenance schedule

and plans with the location of each BMP component. This manual shall include product information cut sheet, shop drawings, vendor information for each component and warranty.

3. Record drawings: 'As-Builts' site plan(s) showing Post Construction BMP. Provide a copy of marked record set with red pencil identifying any variations from design documents.
4. Training Documentation:
    a. OWNER attendees sign off training sheet.
    b. Two DVD's of materials covered in the training and components installed.
5. Post-Construction BMP Maintenance Plan: Submit complete Plan per Attachment "A", edit per As-Built conditions and provide missing information.
6. Records of Closed-Circuit Television Inspection: At Substantial Completion submit to the Owner's Authorized Representative three DVD's of Closed-circuit television inspections performed. Include the following information:
    a. Electronic Media Recordings: Visual and audio record of the entire length of pipe. For existing laterals identify problem areas, such as roots, cracks, fractures, broken pipe, and other unusual conditions found.
    b. Digital Photographs of the pipe condition, connections, points of interest and defects found. Indicate distance of defects to a point of reference such as face of building or mainline. Provide the Digital Photographs after fixing the defective pipes.
    c. Inspection Log: Provide written report including:
        1) Date and time of inspection.
        2) Name of School, Project, CONTRACTOR, and operator name.
        3) Location, material and size of pipe.
        4) Description of defects found and attempts to fix them.

1.6 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic products, pipes, and fittings in direct sunlight.
B. Protect pipe, pipe fittings, and seals from dirt and damage.
C. Handle all products according to manufacturer's written rigging instructions.

1.8 TRAINING OF OWNER PERSONNEL

A. At Substantial Completion and when the storm drainage system is fully operational, knowledgeable representatives from the CONTRACTOR and manufacturer(s) of the components specified and installed at the site shall provide up to 8 hours of training. Date, time and location for the training shall be coordinated through the project Owner's Authorized Representative. Have OWNER attendees sign off training sheet and provide a copy to the Owner's Authorized Representative.
B. Training period shall cover but not be limited to the following:
    1. Explain the operation of storm drainage system and its design intent.
    2. Explain the maintenance requirements of every component of the system.
    3. Provide recommendations of practices to minimize or eliminate negative impact on the system.

4. Provide maintenance schedule as recommended by the manufacturers for every component and review it with OWNER's Maintenance and Operations staff.
5. Conduct a site walk, identify every component of the system and demonstrate its operation.
6. Training shall be conducted with the use of Maintenance log and Maintenance manual.

1.9 SURPLUS MATERIALS

A. Provide enough additional materials for each component of BMP that requires replacement or service during the first year.

PART 2 – MATERIALS AND PRODUCTS

2.1 PIPING MATERIALS

A. General: Minimum 5 feet away from building boundaries. For piping within 5 feet from building boundaries, and interior piping refer to Division 22 plumbing sections. Provide piping system in conformance with Section 207 - Pipe and Section 208 - Pipe Joint Types and Materials of the Standard Specifications for Public Works Construction. All Soil-tight pipes shall be provided with joints that are function of opening size, channel length, and backfill particle size. A backfill material containing a high percentage of fine-graded soils requires investigation for the specific type of joint to be used to guard against soil infiltration, including the requirement for fabric-wrapped joints.
B. Nonreinforced Concrete Pipe (CP): ASTM C14, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.
C. Reinforced Concrete Pipe (RCP): ASTM C76, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.
D. Approved manufacturers: Thompson Pipe Group, or equal.
E. Cast Iron Soil Pipe (CIP):

1. Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.
2. Cast iron soil coupling: Hubless, heavy-duty with neoprene gaskets, stainless steel corrugated shields, and 4 bands of stainless-steel clamps. IAPMO, ASTM C564 and CISPI 310.
3. Approved manufacturers: American Foundry, Mission Rubber Company, Tyler, or equal.

F. Corrugated, Dual Wall, High Density Polyethylene Drainage Pipe (HDPE):

1. Corrugated PE Drainage Pipe and Fittings NPS 4 to NPS 10: AASHTO M 252, Type S (double-wall) with smooth waterway for coupling joints.
2. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294 or ASTM F2306, Type S (double-wall) with smooth waterway for coupling joints.
3. Approved manufacturer: ADS, Hancor, JM Eagle, or equal.

G. Corrugated, Dual or Triple Wall, Polypropylene Pipe (PP):

1. Corrugated PP Drainage Pipe and Fittings NPS 12 to NPS 60: ASTM F2764, ASTM F2881, or AASHTO M 330, Type S (double-wall) or Type D (triple-wall), for respective diameters. Provide coupling joints with smooth waterway.
2. Approved manufacturers: ADS, Prinsco, or equal.

H. PVC (Poly Vinyl Chloride) Schedule 40 DWV Pipe:

1. Conform to ASTM D2665, ASTM F794, and ASTM F1866.
2. Installer of PVC Schedule 40 DWV piping system shall carry ASTM D2855 and ASME B31.3 qualification. Installer shall provide proof of these qualifications to IOR prior to commencing work.
3. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. The safety placards must be visible.
4. Blue or red-hot glue shall not be used.
5. Approved manufacturers and products:

    a. Pipe: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.
    b. Primer: Weld-On P-70 by IPS, Conforming to ASTM F656.
    c. Cement: Weld-On 711 (gray) by IPS, Conforming to ASTM D2564.

I. PVC (Poly Vinyl Chloride) SDR-35 Pipe, 6” through 15”:

1. Conform to ASTM D3034.
2. Gasketed Joints: Elastomeric gasket joints conforming to ASTM D3212.
3. Gaskets: Chloroprene conforming to ASTM F477.
4. Approved manufacturers: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.

2.2 BEDDING MATERIAL FOR PIPE

A. General: Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.
B. Approved manufacturers and products:

1. Propex Fabrics, Inc.: Geotex 451.
2. TenCate Geosynthetics Americas: Mirafi 140N.
3. US Fabrics, Inc.: 120NW.
4. Equal products.

PERFORATED SUBSURFACE DRAIN PIPE

A. Perforations shall be symmetrically located within a maximum arc of 160 degrees. Perforations shall provide a total open area of at least 0.3 square inches per linear foot of pipe, with a minimum of one perforation per linear foot, except for joint areas. Perforation shall be either holes or slots. Hole diameters of ¼-inch minimum to ½-inch maximum. Width of slots of 1/8-inch minimum to 5/16-inch maximum with slot length not exceeding 5 inches.
B. Aggregate Around Perforated Pipe shall be 6 inches of gravel containing no particles finer than a 1/2-inch to 3/4-inch sieve opening size.

STORMWATER TREATMENT SYSTEMS /BMPS

A. GS-2: Catch Basin Inserts, approved manufacturers and products:

1. AbTech Industries: UUF DI-DO.
2. ADS-FlexStorm: FlexStorm Pure or Catch-it.
3. Aquashield Inc.: Aqua-Guardian.
4. Ecosense International: EcoSense International’s Catch Basin Insert.
5. EnviroPod Inc.: LittaTrap.
6. Oldcastle Precast Inc.: FLoGard, or GISB.

7. UltraTech International Inc.: Ultra-Drain Guard.
8. Equal products.

2.3 MANHOLES

A. Provide round reinforced concrete manhole with an H-20 traffic rated hatch & solid cover of minimum 30-inch in diameter with holes of maximum ½-inch in diameter.

2.4 MISCELLANEOUS MATERIALS

A. Metal Covers, Grates, Frames and Accessories:

1. Conform to Section 206 - Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.
2. Hot-dip galvanize steel parts after fabrication in accordance with Section 210 - Paint and Protective Coatings of the Standard Specifications for Public Works Construction.
3. Grates and Frames:

   a. Vandal-proof design and construction.
   b. ADA compliant, in conformance to CBC 11B-302.3.
   c. Rated for vehicular traffic on areas intended for use by motor vehicles.
   d. Hot-dip galvanized.

B. Concrete, Mortar and Related Materials: Conform to Section 32 1313 - Site Concrete Work.
C. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.
D. Underground Concrete Structures: Shall be precast and rated for H-20 traffic loading and applicable soil loads. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.

2.5 NAMEPLATES

A. stainless steel or aluminium nameplate permanently fastened to BMP showing the following information:

1. BMP ID number and BMP type.
2. Next service day followed by a 1-inch by 4-inch long blank space.
3. Manufacturer name, model number, telephone number and stock ID number.
4. Installation or production date.
5. 1-inch by 4-inch blank space for OWNER’s use.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. CONTRACTOR shall arrange for a preconstruction meeting with the manufacturer’s representative to review the basic principles for proper installation of Underground BMP type products prior to any installation.
B. Underground Concrete modules shall be installed in accordance with manufacturer’s instructions and the current ASTM C891 procedures.

3.2 EXCAVATION, BACKFILLING AND COMPACTING

A. Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.

3.3 INSTALLATION OF PIPE

A. Conform to Section 306 - Underground Conduit Construction of the Standard Specifications for Public Works Construction.
B. Non-ferrous drainpipe installed with less than 12 inches of cover to finish grade shall be provided with a 4-inch thick concrete pipe encasement.

3.4 DRAINAGE APPURTENANCES

A. Catch basins, junction chambers, manholes, box culverts, outlet chambers and other drainage structures: Construct as indicated on Drawings and as specified in Section 32 1313 - Site Concrete Work, and in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
B. Ensure that Post Construction BMP have a visible identifying manufacturer tag with product identification, manufacturer contact information, date of last service and date of next service due.
C. Provide storm drain stencil per City or County requirements as applicable.

3.5 ABANDONED DRAINAGE LINES AND STRUCTURES

A. Cap or plug existing drain lines that are cut and abandoned and remove existing drainage structures that are abandoned.

3.6 CLOSED-CIRCUIT TELEVISION INSPECTION

A. Coordinate with Owner’s Authorized Representative time and date of inspection. Project Inspector shall be present during the CCTV inspection.
B. Clean laterals by hydraulic jet.
C. Perform internal closed-circuit television inspection of lateral from the building to the public mainline. Record drain line in its entirety with no breaks or interruptions. Move camera at a speed no greater than 30 feet per minute, stopping for a minimum of ten seconds to record pipe connections, defects, and points of interest.
D. Maintain technical quality, sharp focus and distortion free picture. Pan, tilt, and rotate as necessary to best view and evaluate connections, defects and points of interest.
E. Minimum Requirements for Closed-circuit Television Equipment:

1. Television camera specially designed for pipe inspections, and operative in 100 percent humidity conditions.
2. Camera and television monitor capable of producing minimum 470H-line resolution color video picture.
3. Camera capable to inspect lines as small as three inches up to 70 feet from storm drain mainline.
4. Camera lighting shall be suitable to allow clear picture of inner wall at least ten feet in front.

F. Defective Work:

1. New Lines: Defective Work found shall be repaired at CONTRACTOR’s expense. Perform a new closed-circuit television inspection at no cost to OWNER.
2. Existing Laterals:

a. If roots, sludge, or sediment material or other defect not related to the Work of this project impedes inspection, withdraw camera, restart inspection from opposite end and notify Owner's Authorized Representative of defects found.
b. If obstruction or stoppage was caused by Work related to this project, remove obstruction at no cost to OWNER. Perform a new closed-circuit television inspection at CONTRACTOR's expense.

3.7 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
B. Maintain Post Construction BMP after installation and keep a maintenance log to be turned over to Owner's Authorized Representative at Substantial Completion.

3.8 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION